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# AIRPORTS

October 1977

AD A049879

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BIBLIOGRAPHY

AIRPORTS

OCTOBER 1977

AIRSIDE  
LANDSIDE  
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FORECASTING  
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PLANNING  
FINANCE  
ECONOMICS  
REGULATION

DESIGN  
ACCESS  
CAPACITY  
OPERATIONS  
SAFETY  
SECURITY  
ENVIRONMENT



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DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION  
Washington, D.C. 20591



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The project that is the subject of this report was approved by the Governing Board of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the committee responsible for the report were chosen for their special competence and with regard for appropriate balance.

Technical Report Documentation Page

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13. Type of Report and Period Covered Bibliography	14. Sponsoring Agency Code	15. Supplementary Notes A prototype product of the Air Transportation Research Information Service																		
16. Abstract <p>This bibliography was prepared to illustrate input-output procedures that have been proposed for the implementation of an Air Transportation Research Information Service (ATRIS). The proposed subject scope for ATRIS covers 21 areas that range from <i>aircraft</i> to <i>travel</i> and <i>tourism</i>. The subject of <i>airports</i> was selected as the area for initial input to the ATRIS data base from which this bibliography has been produced. The bibliography has 10 chapters on major aspects of airports, including access, environmental impact, planning and design, safety and security, operations, and management. The bibliography contains nearly 800 references that represent initial input to the machine-readable ATRIS data base. The implementation plan calls for extending the data base to full coverage of all subject areas and to provide both on-line and off-line services to the air transport community.</p> <p>Many of the references were acquired from data bases held by National Aeronautics and Space Administration, National Technical Information Service, Engineering Index, and other information services. Other references were prepared from documents held by various libraries and transportation centers. Selections were made by staff of the Flight Transportation Laboratory at Massachusetts Institute of Technology; final input and output processing was performed by Transportation Research Board information staff.</p> <p>A major purpose for the bibliography is to inform ATRIS users of the services that might be provided and through feed-back from recipients of the bibliography to learn more about the needs and wants of users of air transport information.</p>																				
17. Key Words <table border="0"> <tr> <td>*Airports</td> <td>Planning</td> <td>Access</td> </tr> <tr> <td>Policy</td> <td>Finance</td> <td>Capacity</td> </tr> <tr> <td>Forecasting</td> <td>Economics</td> <td>Operations</td> </tr> <tr> <td>Demand</td> <td>Regulation</td> <td>Safety</td> </tr> <tr> <td>Environment</td> <td>Airside</td> <td>Security</td> </tr> <tr> <td>Management</td> <td>Design</td> <td></td> </tr> </table>		*Airports	Planning	Access	Policy	Finance	Capacity	Forecasting	Economics	Operations	Demand	Regulation	Safety	Environment	Airside	Security	Management	Design		18. Distribution Statement Unlimited availability. Document may be released to the National Technical Information Service, Springfield, Virginia, 22161, for sale to the public.
*Airports	Planning	Access																		
Policy	Finance	Capacity																		
Forecasting	Economics	Operations																		
Demand	Regulation	Safety																		
Environment	Airside	Security																		
Management	Design																			
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 154																		
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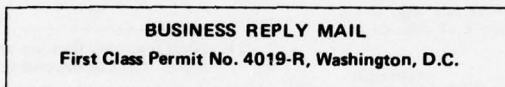
To Recipients of the ATRIS Prototype Bibliography

By filling out and returning this questionnaire you can greatly assist the Transportation Research Board Committee on Air Transportation Research Information Service (ATRIS) to learn about the information needs and practices of the air transport community, and to learn what services and products the community may wish to see developed.

After you have examined your copy of the bibliography, please take the time to respond to the twenty-four short-answer questions on the inside page, then fold and fasten the page for postage-free return. Your cooperation is most appreciated.

The ATRIS Committee

— fold —



Transportation Research Board  
National Research Council  
2101 Constitution Avenue, N.W.  
Washington, D.C. 20418

Attention: ATRIS

— fold —

Respondent organization \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



1. Name of respondent \_\_\_\_\_

Title or position \_\_\_\_\_

Organization name and address (fill in on reverse side of this page)

2. If there is someone other than yourself who would be the best contact for future communications between ATRIS and your organization, please provide the name and position of that person.

Name of contact \_\_\_\_\_

Title or position \_\_\_\_\_

3. What is (are) the major mission(s) or role(s) of your organization with respect to air transportation?

4. About how many professional people in your organization have job-related concerns for air transport research information?

5. Please place an H, M, L, or N in front of each air transport subject area listed below to indicate whether the area is of relatively high (H), medium (M), low (L), or no (N) concern to the mission of your organization.

_____ aircraft	_____ finance	_____ meteorology
_____ airlines	_____ forecasts	_____ navigation
_____ airports	_____ fuels	_____ passenger demand
_____ air freight	_____ general aviation	_____ personnel
_____ air traffic control	_____ government policy, planning, and regulation	_____ safety
_____ economics		_____ security
_____ environment		_____ travel and tourism
_____ facilitation	_____ marketing	

6. Please place an H, M, L, or N in front of the information types listed below to indicate whether the type has relatively high (H), medium (M), low (L), or no (N) value for the work of your organization.

_____ technical reports	_____ accident reports	_____ statistical data
_____ policy and planning reports	_____ legislation	_____ resumes of ongoing research projects
_____ socioeconomic studies	_____ hearing testimony	
_____ journal articles	_____ news articles	
_____ conference papers		

7. What is the modal distribution of the transportation concerns of your organization?

_____ % air	_____ % public travel	_____ % _____
_____ % highway	_____ % water	_____ % _____
_____ % rail	_____ % multimodal	_____ % _____

8. Please list the three or four most important sources of information for the work of your organization.

9. What do you estimate to be the division between your information needs as an end user and as an intermediary for the needs of others in your organization?

\_\_\_\_\_ % end user \_\_\_\_\_ % intermediary for others

10. What do you estimate to be the division between your information needs for current awareness on air transport and for specific information on some aspect of air transport?

\_\_\_\_\_ % current awareness \_\_\_\_\_ % specific information

11. About how often do you browse through air transport information in your library or at your desk to meet your current awareness information needs?

Once per \_\_\_\_\_

12. About how many times per month do you need to go to others for specific information on air transport?

13. Does the ATRIS prototype bibliography make a high, medium, low, or no contribution to your information needs?

☐ high ☐ medium ☐ low ☐ no

14. Do you rate the bibliography's coverage of airport information as high, medium, or low?

☐ high ☐ medium ☐ low

15. What improvements or changes would make the airport bibliography of greater value?

*If the prototype bibliography were extended to cover all air transport subjects listed in question 5 and all information types listed in question 6 and were issued on a regular basis,*

16. Would the publication make a high, medium, low, or no contribution to the satisfaction of your information needs?

☐ high ☐ medium ☐ low ☐ no

17. For about how many professional people in your organization would such a publication have high or medium value?

18. How many times per year would such a publication have to be issued to maximize its value?

*If the references illustrated by the prototype bibliography were extended to all air transport subjects and information types and were incorporated in a data base for retrieval of specific information,*

19. About how many times per year do you estimate the retrievals from the data base would be useful in your work?

20. What response time would satisfy most of your needs for references on specific topics?

\_\_\_\_\_ days

21. What response time do you require for delivery of full-text documents that correspond to relevant references?

\_\_\_\_\_ days

22. Would you use on-line retrieval if on-line access were provided for the data base?

☐ yes ☐ no If no, why not? \_\_\_\_\_

23. An open-ended list of common information resources is given below. Please estimate the number of times per month that you use each resource to meet your information needs and indicate the level of satisfaction (H, M, L, N) you generally experience.

Resource	Times per Month	Satisfaction
In-house library	_____	_____
Other in-house intermediary	_____	_____
Outside library	_____	_____
Other outside resource	_____	_____

24. An open-ended list of secondary information services is given below. Please indicate your level of knowledge about the service (H, M, L, N); the frequency (number of times per year) you have used the service; the mode in which you have used the service, i.e., through service publications (P), batch-mode retrieval (B), or on-line retrieval (O); and the level of satisfaction (H, M, L, N) that you have generally experienced with this service.

Service	Knowledge	Frequency Used	Mode Used	Satisfaction
NTIS	_____	_____	_____	_____
Ei	_____	_____	_____	_____
SSIE	_____	_____	_____	_____
HRIS	_____	_____	_____	_____
RRIS	_____	_____	_____	_____
MRIS	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

# FOREWORD AND ACKNOWLEDGMENTS

This bibliography is one of two reports that have been prepared under the auspices of the Transportation Research Board Committee on Air Transportation Research Information Service (ATRIS) and through contractual agreement with the Federal Aviation Administration.

The first report, *Implementation Plan for an Air Transportation Research Information Service*, defined information scope, described the potential user community, discussed costs and funding alternatives, and set forth specific procedures for input and output operations.

This second report serves to demonstrate many of the proposed input-output operations; it also provides a tangible means for informing the potential user community of services that might be provided and for learning more about the community's needs and wants for ATRIS products and services.

The proposed subject scope for ATRIS is represented by 21 subject areas that range from *aircraft to travel and tourism*. One of these areas, *airports*, was selected by the committee as the area for initial input to the ATRIS data base and as the most appropriate area for this prototype bibliography. The bibliography contains nearly 800 references that represent initial input to the machine-readable ATRIS data base. The implementation plan calls for extending the data base to full

coverage of all subject areas and to provide both on-line and off-line services to the air transport community.

The majority of references contained in this bibliography were identified initially by staff of the Flight Transportation Laboratory, Massachusetts Institute of Technology. Additionally, the FTL staff provided documentation support and other assistance to the information staff of the Transportation Research Board. Final documentation and input-output processing was performed by the TRB staff.

Through an agreement between the U.S. Department of Transportation and the National Aeronautics and Space Administration, several hundred references held by NASA information services were made available for inclusion in this bibliography. Other reference sources include the National Technical Information Service, Engineering Index, and the highway (HRIS), railroad (RRIS), and maritime (MRIS) research information services that are operated by TRB.

The Transportation Research Board gratefully acknowledges the contributions and support that have been provided by the ATRIS committee, the Flight Transportation Laboratory, the Federal Aviation Administration, NASA, and other organizations that have assisted in the preparation of this bibliography.

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# CONTENTS

FOREWORD AND ACKNOWLEDGMENTS.....	i	CHAPTER 6. AIRPORT PLANNING AND DESIGN.....	68
EXPLANATORY NOTES.....	iv	CHAPTER 7. AIRPORT SAFETY AND SECURITY.....	75
ILLUSTRATIONS OF REFERENCES AND INDEXES .....	v	CHAPTER 8. AIRSIDE DESIGN AND OPERATIONS.....	79
ABBREVIATIONS AND DOCUMENT AVAILABILITY .....	vi	CHAPTER 9. LANDSIDE DESIGN AND OPERATIONS.....	101
CHAPTER 1. AIRPORT ACCESS.....	1	CHAPTER 10. TERMINAL DESIGN AND OPERATIONS.....	106
CHAPTER 2. AIRPORT ECONOMICS AND FINANCE .....	22	SOURCE INDEX.....	117
CHAPTER 3. AIRPORT ENVIRONMENTAL IMPACT.....	31	AUTHOR INDEX .....	124
CHAPTER 4. AIRPORT DEMAND AND FORECASTS .....	57	RETRIEVAL TERM INDEX .....	130
CHAPTER 5. AIRPORT MANAGEMENT, REGULATION AND POLICY .....	63		



# EXPLANATORY NOTES

This bibliography is representative of the present contents of the machine-readable ATRIS data base; it contains nearly 800 references to reports, conference papers, journal articles, and other documents about airports. References are grouped in 10 chapters; each reference has been assigned, sometimes arbitrarily, to a chapter that corresponds to the main content of the referenced document.

Terms used in chapter headings are defined as follows: *Airport access* refers to the surface movements of vehicles outside the airport property and includes vocational problems for new airports and satellite terminals. *Airside* refers to the aircraft movement from the gate along taxiways and runways into the air space around the airport. *Landside* refers to the movement of surface vehicles on the airport property and includes roadways, parking lots, curbside operations, and inter-terminal people movers. *Terminals* are the linking element between landside and airside in which passengers and cargo are processed.

Elements of individual references are illustrated on the facing page. Each reference is identified by a two-digit chapter number and a six-digit accession number. Within a given chapter references are listed in the ascending order of their accession numbers.

Identification numbers are followed by the document title in bold face capital letters and then by an abstract of the document. The next part of the reference gives bibliographic data that include the names of personal or corporate authors, publication names, report or issue numbers, contract numbers when applicable, date of publication, and number of pages, figures, tables, and citations. Finally the reference acknowledges sources of abstracts and ends with a statement about availability of the referenced document. A list of frequently appearing abbreviations and further explanation of document availability are given on page vi.

Chapter 10 is followed by three indexes that are also illustrated on the facing page. The first is an index to document sources, i.e., organizations and publications that were the generators of the documents that have been referenced. The second index is to personal authors of the referenced documents. The last index contains all specific subject terms that have been assigned to the references in this volume. This index is essentially a retrieval vocabulary for locating references on subjects that are much more specific than the chapter headings. Under each term in the three indexes are posted the chapter numbers and accession numbers of references that correspond to the term.

# ILLUSTRATIONS OF REFERENCES AND INDEXES

## REPORT REFERENCE

Accession number —————→ 04 158216  
 Chapter number —————→

Title —————→ **DEMAND FORECASTING IN TOURISM**  
 Abstract —————→ The aims of this book are to explain the fundamental theoretical and practical bases of the principal methods used to analyse and forecast demand and, secondly, to examine the state of the art in the practical application of these techniques. The main emphasis is given to analytical techniques especially those with an economic basis. The concept of demand is treated in outline in chapter 1 and A general description of the main forecasting techniques is provided in chapter 2. Several of the principal methods are selected for more detailed examination in subsequent chapters. Chapter 3 deals with the theoretical and statistical background of some of the more rigorous techniques. Chapters 4 and 5 are concerned with recent applications of these approaches and chapter 6 provides A description of delphi models and their use in research. A comprehensive annotated bibliography of recent work is included.

Author —————→ Archer, BH  
 Publishing and document data —————→ Wales University Press Monograph No. 9, 1976, 123 pp, 14 Fig., 1 Tab., 65 Ref.

Source of abstract —————→ ACKNOWLEDGMENT TRRL (IRRD 224676)  
 Availability statement —————→ ORDER FROM: Wales University Press, University College of North Wales, Bangor, Wales

## SOURCE INDEX

VERVE RESEARCH CORPORATION 7910 Woodmont Avenue, Bethesda, Maryland  
 04 136851

W

Source of referenced document —————→ WALES UNIVERSITY PRESS University College of North Wales, Bangor, Wales  
 Chapter and accession numbers —————→ 04 158216  
 for reference location

## AUTHOR INDEX

ARATA, WH, JR  
 05 155872

Author of referenced document —————→ ARCHER, BH  
 Chapter and accession numbers —————→ 04 158216  
 for reference location —————→ ARMSTRONG, HW  
 01 155674

## RETRIEVAL TERM INDEX

TORONTO ISLAND AIRPORT  
 06 155865

Subject term —————→ TOURISM  
 Chapter and accession numbers —————→ 02 155751, 04 158216, 06 155806  
 of all references indexed to this term —————→ TOWER  
 08 054427  
 TOWER AUTOMATED GROUND SURVEILLANCE  
 08 155595

# ABBREVIATIONS AND DOCUMENT AVAILABILITY

## ABBREVIATIONS

Abbreviations that appear frequently throughout this bibliography are listed below. A mailing address is included for organizations whose abbreviations appear in availability statements and from which the respective documents may be ordered.

### Document Data Abbreviations

App	Appendixes
Fig	Figures
PB	Prefix of NTIS accession numbers
Phot	Photographs
Ref	References
Repr PC	Paper copy of original document
Rept	Report
Tab	Tables

### Organization Abbreviations

**AI AA**  
American Institute of Aeronautics and Astronautics  
Technical Information Service  
750 Third Avenue  
New York, NY 10017

**ASCE**  
American Society of Civil Engineers  
345 East Forty-seventh Street  
New York, NY 10017

**ASME**  
American Society of Mechanical Engineers  
345 East Forty-seventh Street  
New York, NY 10017

**ATA**  
Air Transport Association of America

**CAB**  
Civil Aeronautics Board

**EI**  
Engineering Index

**ESL**  
Engineering Societies Library  
345 East Forty-seventh Street  
New York, NY 10017

**FAA**  
Federal Aviation Administration

**GPO**  
Superintendent of Documents  
U.S. Government Printing Office  
Washington, DC 20402

**IATA**  
International Air Transport Association

**ICAO**  
International Civil Aviation Organization

**IRRD**  
International Road Research Documentation

**ITA**  
Institute of Air Transport

**NASA**  
National Aeronautics and Space Administration

**NTIS**  
National Technical Information Service  
5285 Port Royal Road  
Springfield, VA 22161

**SAE**  
Society of Automotive Engineers

**TRB**  
Transportation Research Board  
2101 Constitution Avenue, N.W.  
Washington, DC 20418

**TRRL**  
Transport and Road Research Laboratory  
Crowthorne, Berkshire RG11 6AU  
England

**TSC**  
Transportation Systems Center

**UITP**  
International Union of Public Transport

**UMTA**  
Urban Mass Transportation Administration

**XUM**  
University Microfilms International  
300 North Zeeb Road  
Ann Arbor, MI 48106

## DOCUMENT AVAILABILITY

Loan and photocopy service for documents referenced in this bibliography can be requested from the two university libraries listed below. These libraries are functioning as TRISNET centers in the operation of a prototype document delivery system under contract to the U.S. Department of Transportation. Requests for document services from either library should include the accession number, author, title, publisher or journal name, and date of publication as given in the respective references.

Transportation Center Library  
Northwestern University Library  
Evanston, IL 60201  
312-492-5273  
TWX-910-231-0872

Institute of Transportation Studies Library  
University of California  
412 McLaughlin Hall  
Berkeley, CA 94720  
415-642-3604



## Chapter 1 AIRPORT ACCESS

01 039876

### HIGH SPEED GROUND TRANSPORTATION. DOCUMENTATION OF PRELIMINARY ENGINEERING, LOS ANGELES INTERNATIONAL AIRPORT AND THE SAN FERNANDO VALLEY

The report documents work completed under Phase 3 of a project to construct a high speed ground rapid transit access facility between Los Angeles International Airport and the San Fernando Valley. Service in this corridor will be provided by tracked air-cushion vehicles running on a special guideway. Phase 3 of the project included preliminary engineering studies and continued development of the route and structures.

See also report dated Nov 70, PB-197 962.

Kaiser Engineers-DMJM Engry Dec 72-1-RE, Apr. 1972, 175 pp

Contract DOT-UT-312

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-211833

01 041878

### SAN FRANCISCO AIRPORT ACCESS PROJECT-SUMMARY

The report summarizes an earlier study of the feasibility of extending the Bay Area Rapid Transit (BART) system to serve San Francisco International Airport. This summary was prepared to answer several basic questions about the proposed BART extensions: (1) How can such transit help. (2) How soon is it needed. (3) What will it be like. (4) How might the cost be shared. (5) Will it be built. A proposed route description and various financing alternatives are discussed.

Prepared in cooperation with Wilbur Smith and Associates, and Kirker, Chapman, Consultants.

Parsons, Brinckerhoff-Tudor-Bechtel Summr Rpt May 1972, 40p

Contract DOT-UT-262

ACKNOWLEDGMENT: NTIS

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PB-212456

01 043627

### SAN FRANCISCO AIRPORT ACCESS PROJECT

The project developed recommendations for an extension of the Bay Area Rapid Transit (BART) system to provide rapid transit access at San Francisco International Airport. Project background and the need for improved airport access are discussed. The report gives particular attention to the proposed route location which will follow the Market St. Railway corridor through Daly City and Colma. Relevant aspects of the route profile and proposed service are described. System planning aspects are examined with reference to operations, service schedules, rolling stock, train control and communications, power distribution, fare collection, support facilities, and baggage handling. Estimates of patronage and revenues are considered along with specific preliminary features for the stations and guideways. The report also contains detailed cost estimates, impact analyses, and an overall evaluation of the project in terms of urban development objectives. (Author)

Prepared in cooperation with Kirker, Chapman and Associates and Wilbur Smith and Associates.

Parsons, Brinckerhoff-Tudor-Bechtel, (UMTA-CA-09-0012) Final Rpt  
Oct. 1972, 327 pp

Contract DOT-UT-262

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-213411

01 043911

### ANALYSIS AND EVALUATION OF THE RAPID TRANSIT EXTENSION TO CLEVELAND'S AIRPORT

During the late 1960s, one of Cleveland's two rapid transit lines was extended by slightly more than 4 miles to the airport. Two of the three new stations (including one at airport) were opened on November 15, 1968, and the third one (Brookpark) was opened on April 20, 1969. The three stations, including the connecting trackage, rights-of-way, and transit cars, were added to the system at a total capital outlay of about \$18.4 million. The rolling stock for extension service accounts for \$3.4 million of the total. Federal funds covered two-thirds of the total capital costs; the remainder was paid out of city and county funds. Now, based on 3 full years of actual operating experience, what can be said about the impact of the line on the general public and on users? Also, what inferences can be made about similar proposals in other cities? It should be emphasized that the analyses, findings, and conclusions of this report are based on limited experience, on sample survey data, and on data collected during years of some rather extraordinary change. As a consequence, they are somewhat tentative, though as complete, accurate, and reasonable as possible.

Sponsored by Committee on Passenger and Freight Transportation Characteristics and Committee on Transportation Programming, Planning and Evaluation. Library of Congress Catalog Card No. 72-12128.

Wohl, M (Urban Institute) *Transportation Research Record* No. 417, ISBN 0-309-02089-1, 1972, pp 12-24, 2 Fig, 3 Tab, 12 Ref

ORDER FROM: TRB Publications Off

01 044065

### PUBLIC TRANSPORTATION TO AIRPORTS

With the forecast limitations on highway access and parking facilities, an alternative for handling congestion and increasing demand is the use of public transit systems. The Highway Research Board's Committee on Passenger Transportation Economics and Special Committee on International Cooperative Activities held a day-long symposium during the 49th Annual Meeting of the Highway Research Board to examine the potentials of public transportation to airports. Seven speakers from different parts of the world were asked to address the symposium regarding their current plans for public transportation to airports. The presentations and informal notes of several of the speakers are included in this RECORD. The conferees discussed current transit facilities at airports in the United States, Europe, and Asia. In Tokyo there is a separate monorail facility running from downtown Tokyo to Tokyo International Airport. In Cleveland, Boston, and London and at a number of airports throughout the world there are existing subway and railroad links connecting the airport to the rest of the transit and railroad systems. For a number of airports, there are downtown check-in terminals, and buses are used on existing streets and arterials to get to the airport; and for several airports, consideration is being given to separate bus rights-of-way between the central business district and the airport.

This publication consists of 7 related reports.  
*Transportation Research Record* No. 330, 1970, 32 pp

ORDER FROM: TRB Publications Off

01 044205

#### CLEVELAND-HOPKINS AIRPORT ACCESS STUDY: SURVEY RESULTS

The impact of providing rapid rail transit service between the Cleveland central business district and Hopkins Airport is assessed with reference to modal split and ridership characteristics. Two separate surveys of airport users were correlated, representing characteristic ridership profiles by mode both before and after the transit link became operational. The report outlines data collected concerning: overall airport activity and transit ridership; characteristics of air passengers, air trips, and ground trips to the airport; passenger-related visitors; airport employees; and casual visitors. Findings include: (1) Nearly 58% of all transit riders were air passengers, and only 1/4 of this group began their trips in the Cleveland central business district. (2) Approximately 14.5% of all air passengers at Hopkins Airport used the rapid transit for airport access. More significantly, at least 25% of all air passengers with origin or destination in the rapid transit service area used the system. (3) All modes of travel indicated some ridership diverted to the rapid transit. (4) Transit use rose to more than 30% among air passengers traveling to or from terminals of the rapid transit system. (5) Ridership among airport employees rose from 8% to 18%. (6) Transit was also used by small percentages of passenger-related and casual airport visitors.

Regional Planning Commission, Cuyahoga County, (Trd-36) June 1970

ACKNOWLEDGMENT: UMTA  
 ORDER FROM: NTIS

PB-195045

01 044206

#### CLEVELAND-HOPKINS AIRPORT ACCESS STUDY: SURVEY PROCEDURES

The purpose was to assess a new rail rapid transit extension between the Cleveland central business district and Hopkins Airport with reference to its impact on modal split and ridership. Data was collected by questionnaire before and after the commencement of transit operations. Design methodology, data collection, and control information sample questionnaires are reproduced in their original forms. Areas are outlined for each of four categories of origin and destination surveys (air passengers, passenger-related visitors, casual visitors, and airport employees). Although it was possible to poll air travelers accurately aboard their planes, special procedures were necessary to survey the airport visitors. A ground surveillance survey was designed to estimate airport use by people in these categories through sample counts of persons at selected portals, vehicles at certain locations, parking demand, and other guidelines. Appended material locates survey centers on airport maps and details instructions for project managers and participants.

Regional Planning Commission, Cuyahoga County, (Trd-36) May 1970

ACKNOWLEDGMENT: UMTA  
 ORDER FROM: NTIS

PB-195046

01 046998

#### PATRONAGE AND REVENUE ESTIMATES FOR THE SAN FRANCISCO AIRPORT ACCESS PROJECT

In many cities around the world concurrent growth of air transportation and congested urban development around airports have created an urgent need for fast, reliable, and safe ground access between airports and areas which they serve. This paper discusses a particular aspect of ground access for San Francisco International Airport—an extension of the San Francisco Bay Area Rapid Transit System for about 10 miles (16 kilometers) from its existing terminus at Daly City. Background for the problem, the approach to solving it, and one major aspect of the solution thus far, the development of patronage and revenue estimates, will be described.

Altshuler, E. *Traffic Quarterly* Jan. 1973, pp 65-76

ORDER FROM: Eno Foundation for Transportation, Incorporated, P.O. Box 55, Saugatuck Station, Westport, Connecticut, 06880

01 047566

#### INTERCITY TRANSPORTATION EFFECTIVENESS ACCESS/ASSIGNMENT MODEL

The Intercity Transportation Effectiveness- Access/Assignment Model is a planning tool designed to evaluate the alternatives available for increasing the capacity of groundside passenger handling facilities to accommodate the expected increase in air travel, specifically the expansion of existing airports, the construction of new airports, and the construction of off-site or satellite passenger processing facilities. The report contains the formulation of the model, a description of the testing of the model, and the results of these tests. (Author Modified Abstract)

See also PB-219 786 and PB-219 788.

Batchelder, JH Ward, DE  
 Peat, Marwick, Mitchell and Company Final Rpt Nov. 1971, 121 pp

Contract DOT-OS-00027

ACKNOWLEDGMENT: NTIS  
 ORDER FROM: NTIS

PB-219787/9

01 051326

#### NS BEGINS WORK ON SCHIPHOL LINE

Construction of a direct line from Amsterdam to Leiden will save 9 km over the existing route and give rail access to Schiphol airport. The Amsterdam end of the line is due for completion in 1977, but studies are still in progress to decide the means of entry into the urban area.

*Railway Gazette International* Vol. 129 No. 11, Nov. 1973, pp 433-434

ACKNOWLEDGMENT: Railway Gazette International  
 ORDER FROM: IPC Transport Press

01 051438

#### AIRPORT ACCESS COST-EFFECTIVENESS ANALYSIS

A cost-effectiveness analysis of alternative airport access systems is described. The purpose of this study is to help define a national policy for airport development. Based on an extensive assessment of costs and travel times, optimal modes are defined for different values of travel time for different kinds of cities, ranges of airport traffic volumes and of airport distance from the center city. Highway modes appear most cost-effective, whether private autos for those who have them, or busways, taxis or limousines for the other half of the traffic. High speed railroad and VTOL systems are seen to be cost-effective except for very special cases.

de Neufville, R Mierzejewski, E *ASCE Journal of Transportation Engineering* Vol. 98 No. TE3, Paper #9141, Aug. 1972, pp 663-678

ACKNOWLEDGMENT: ASCE  
 ORDER FROM: ESL

01 051466

#### AIRPORT ACCESS/EGRESS SYSTEMS STUDY. VOLUME I. TEXT

Studies of airport activities and user characteristics at 34 high volume U. S. airports indicate that disbursed trip origins cannot economically justify rapid transit corridor investments dedicated to airport access travel. Generally, airports have too much off-roadway parking in central terminal areas and this concentration of vehicular activities near terminal buildings congest internal roadways. The study proposes a number of low-capital improvement concepts to airport access/egress. These improvements are generally directed towards improving the traffic flow in the central terminal area through better flow controls, diversion of automobile traffic from the central terminal area, and changes in travel patterns. The latter can be changes in mode and/or time of travel. Three specific operational experiments are proposed to evaluate the effectiveness of the proposed concepts. The experiments are a remote parking experiment at Detroit Metropolitan Airport, bus-rail links from La Guardia and Kennedy Airports in New York and evaluation of a garage-baggage handling system at Seattle-Tacoma Airport. Cost of implementing all these experiments is estimated to be \$1.444 million.

Prepared by Smith (Wilbur), and Associates, New York. See also Volume 2, PB-223 842.

Whitlock, EM Sanders, DB

Transportation Systems Center Final Rpt DOT-TSC-OST-73-32-1, Sept. 1973, 178 pp

Contract DOT-TSC-462-1

ACKNOWLEDGMENT: NTIS (PB-223806/1)  
ORDER FROM: NTIS

PB-223806/1, DOTL NTIS

01 051467

## AIRPORT ACCESS/EGRESS SYSTEMS STUDY. VOLUME II. APPENDIXES

This report includes: Airport survey questionnaire; Airport description; Remote parking questionnaire; Passenger counting record; On-bus survey questionnaire; Passenger count record; Automobile baggage check-in survey forms; Bibliography.

Prepared by Smith (Wilbur), and Associates, New York. See also Volume I, PB-223 806.

Whitlock, EM Sanders, DB

Transportation Systems Center Final Rpt DOT-TSC-OST-73-32-2, Sept. 1973, 277p

Contract DOT-TSC-462-2

ACKNOWLEDGMENT: NTIS  
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PB-223842/6

01 051555

## THE ROLE GROUND TRANSPORTATION CAN PLAY IN THE AIRPORT SITE SELECTION PROCESS

This paper relates significant aspects of the mass transit system analysis activity associated with the recent South Florida Airport Site Selection Program. The configuration, performance, cost, and service characteristics of the quasi-conceptual ground access transportation systems continually represented one of the main decision factors as the Review Authorities deliberated on each candidate airport site. Discussion of the transportation system impact on these deliberations is essentially the prime objective of this presentation.

Contributed by the Intersociety Committee on Transportation for presentation at the Intersociety Conference on Transportation, Denver, Colo., Sept. 23-27, 1973.

McGinnis, NF (TRW Transportation and Environmental Operations)  
American Society of Mechanical Engineers Paper 73-ICT-70, Sept. 1973, 16 pp, 11 Fig, 7 Tab

ACKNOWLEDGMENT: ASME  
ORDER FROM: ESL

01 054550

## DULLES AIRPORT RAPID TRANSIT SERVICE. A FEASIBILITY STUDY

The study investigates the feasibility of extending a rapid transit line, in the median of the Dulles access highway from its projected junction with Interstate 66 to the Dulles International Airport, to be operated in conjunction with the Washington Metro System. The report encompasses requirements for right-of-way, fixed facilities and vehicles, and alternative methods and schedules of operation. Estimated capital and operating costs related to these factors have also been developed. Forecasts have been made for various time frames to estimate the numbers of travellers who would make use of this service, and revenues generated by this traffic have been projected. (DOT abstract)

Prepared in cooperation with Day and Zimmermann Consulting Services, Philadelphia, Pa.

Washington Metropolitan Area Transit Authority July 1971, 169 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-201619

01 072047

## INTER-AIRPORT CONNECTION CGN-DUC WITH A HIGH-EFFICIENCY RAPID TRANSIT SYSTEM

[Flughafenverbindung CGN-DUC mit einer Hochleistungsschnellbahn]

The report projects the demand for a high-efficiency rapid transit system (HSB) between the airports of Cologne (CGN) and Duesseldorf (DUC) for 1980 and compares it to the demand of 1968. The projection is based on the existing structure of the airport access and may have to be adjusted when new systems are introduced. Investments and costs of a high efficiency rapid transit access (HSB) are calculated. A table gives travel time for the airport access. [German]

Kilian

Messerschmitt-Boelkow-Blohm GmbH July 1973, 11 pp, 1 Tab., 1 Ref.

ACKNOWLEDGMENT: TSC

ORDER FROM: Messerschmitt-Boelkow-Blohm GmbH, Munich, West Germany

01 073875

## PERFORMANCE STANDARDS FOR INTRA-AIRPORT PEOPLE-MOVING SYSTEMS

The performance standards that should be taken into account in specifying a batch-type people-moving system for intra-airport service are discussed. The basic system constraints are discussed with respect to their influence upon the nature and design of the system. The general requirements of the system and the specific requirements of the subsystems as well as certain contractor performance requirements that must be met in order to attain the highest quality transportation system possible are described.

Shields, CB Lindell, HW

Society of Automotive Engineers 700260, Apr. 1970

ACKNOWLEDGMENT: Flight Transportation Laboratory, MIT (FTL 3-3)

ORDER FROM: Massachusetts Institute of Technology, Flight Transportation Laboratory, Cambridge, Massachusetts, 02139

01 073886

## MODAL SPLIT MODELS FOR AIRPORT ACCESS

This report discusses and calibrates different modal split models which predict the share of access trips carried by an airport limousine service. The purpose of the analysis was to determine which of several alternative models are best suited for this prediction and to establish the nature of the demand itself. Unlike comprehensive demand models, modal split models assume that the total number of access trips is fixed and must merely be "split" between access modes. The underlying assumption is that the level of service provided by the different modes does not affect the total demand for air trips. Since the demand for air transportation is indeed, probably insensitive to moderate changes in access systems, modal split models seem appropriate for a first look at airport access. The report discusses two general forms of modal split models, aggregate and disaggregate, and their application to airport access. Aggregate models are calibrated with zonal averages of passengers and trip characteristics. Disaggregate models, attempt to explain intrazonal as well as interzonal variations. The development of the disaggregate and aggregate modal split models are presented in two separate sections. The authors have attempted to calibrate models which would predict the share of one mode only-limousine. It was felt that a one-mode model would be sufficient to evaluate the various model formulations and calibration techniques to be tested.

Koller, F Skinner, R

Massachusetts Institute of Technology R70-47, Aug. 1970

ACKNOWLEDGMENT: Flight Transportation Laboratory, MIT (FTL 3-3)

01 073899

## AIRPORT ACCESS MODES: A COST-EFFECTIVENESS ANALYSIS

An extensive cost-effectiveness is used to define regions of dominance for different modes of airport access. It appears, after examination of sixty-four different situations covering a range of airport sizes, distances of the airport from the center city, types of cities, and kinds of travellers, that certain popular modes do not appear cost-effective.

De Neufville, R Mierzejewski, E

Massachusetts Institute of Technology Mar. 1971



ACKNOWLEDGMENT: Flight Transportation Laboratory, MIT (FTL 3-3)  
ORDER FROM: Massachusetts Institute of Technology, Flight Transportation Laboratory, Cambridge, Massachusetts, 02139

01 080637

**APPROACHES FOR IMPROVING AIRPORT ACCESS**

There are two airport access travel markets: (1) the Central Business District-to-airport market; (2) the suburban-to-airport market. Approaches for improving airport access include: (1) improvements in existing limousine service; (2) demand-activated transportation service; (3) priority access routes for public transportation; (4) satellite terminals; and (5) extension of the regional rapid transit systems to airports. An economic analysis of the first four of these alternatives leads to the following conclusions: (1) it is possible to provide economically viable service both to low and high-density areas; and (2) increased service to low-density areas may be provided by either extending reservation routes to transfer points where free parking and taxi services are available or by operation of group-riding service.

Ellis, RH Bennett, JC Rassam, PR (Peat, Marwick, Mitchell and Company) *ASCE Journal of Transportation Engineering* Vol. 100 No. TE3, Proc. Paper 10737, Aug. 1974, pp 661-673, 7 Fig., 5 Tab., 4 Ref., 2 App.

ORDER FROM: ESL

01 093409

**THE APPLICATION OF SIMULATION METHODS TO INTRA-AIRPORT LANDSIDE PROBLEMS**

This report describes methods of analyzing the flow of people through the airport landside, which is defined as extending between the airport boundary and the arrival/departure gates. Passenger delay for specified flow and holding values is taken as the desirable measure or level of service. Simulation is determined as the best method of analysis. Two types of simulation techniques are: (1) The deterministic accounting model evaluates mean delay or occupancies; and (2) The time oriented queueing theory model determines delay or occupancy distributions. The second is demonstrated as most accurately representing the stochastic interrelationships among the various landside elements. Various existing models are reviewed and two are recommended as offering potential applicability to investigate airport landside traffic.

McCabe, L Carberry, TF  
Transportation Systems Center, Federal Aviation Administration Intrm Rpt. FAA-RD-75-169, TSC-FAA-75-12, Sept. 1975, 91 pp, Figs., Tabs., 14 Ref., 2 App.

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD-A017084/5ST

01 097723

**ACCESS TO AIRPORTS USING HIGH SPEED GROUND MODES**

This paper examines the application of high speed ground transport systems as a possible access mode to a range of regional airport sizes. Based on the access origin-destination data collected over the last five years at British airports, a modal split analysis is made and related to the main access features of regional airports which are the dispersion of origins and destinations around the airport, the extent of urbanisation and the proximity of airports to high speed road systems. Possible options for handling the increasing traffic at British airports include that of decentralising traffic from London. This scenario is examined for the feasibility of introducing available or developing high speed segregated access modes, using generalised cost functions for modal split analysis. It is found that only for traffic in excess of 3 million passengers per annum is such a strategy attractive. Below this figure, the airport bus, using the existing regional motorway system, is more economic and flexible. Under either system, however, the predominance of the private car is expected to remain.

Ashford, N McGinity, P (Loughborough University of Technology, England) *High Speed Ground Transportation Journal* Vol. 9 No. 1, Mar. 1975, pp 495-501, 1 Fig., 3 Tab., 7 Ref.

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4

01 098920

**TOWARDS ESTIMATING THE IMPACT OF THE DALLAS-FORT WORTH REGIONAL AIRPORT ON GROUND TRANSPORTATION PATTERNS**

This study of the impact of the Dallas-Forth Worth Regional Airport on ground transportation of this region, focusses on the isolation of changes in ground transportation pattern that can be attributed to the new regional airport. The research is directed toward producing results and developing methodology that can be applied to evaluating the impact of other major new regional airports. The research explores the possibility of relating ground traffic volumes with routinely-kept data on airport activity. Details are given of the procedure in which models will be developed for estimating changes in ground transportation patterns and a flow chart diagramming the logical procedure of this task is presented. The different concepts represented here include traffic reassignment, trip generation, trip distribution, modal split, and revised traffic assignment. Disaggregate behavioral models will be developed of both intercity and regional modal split. Airport characteristics related to ground transportation patterns will be identified, defined and measured.

Prepared for Department of Transportation.

Dunlay, WJ, Jr Henry, L  
Texas University, Austin DOT OS 30093 RM 17, Sept. 1974, 38 pp, 1 Fig., 5 Tab., Refs.

01 099521

**AIRPORT GROUND ACCESS: AN OVERVIEW OF CURRENT MODES**

Airport access systems are defined in four categories: distribution within airports; circulation within airport complexes and environs; access to the airport complex from remote points in the urban area; and regional high speed systems. The concept of airport access, and difficulties associated with special purpose solutions outside the general urban transportation problem are addressed. Systems that are available, or are under development, for each category are discussed, and the status of development of more advanced systems is described. Some of the systems reported include moving walks, high speed moving walks, loops shuttles, remote parking links, special purpose access links, and high speed regional systems. /GMRL/

Ross, HR (Ross (Howard R) Associates)  
Society of Automotive Engineers, (SASI-75-1086) SAE #750622, Apr. 1975, 14 pp

ORDER FROM: ESL

01 127819

**GROUND TRANSPORTATION SYSTEM FOR BRADLEY INTERNATIONAL AIRPORT**

An automatically controlled transit system is being installed at Bradley International Airport. The system has two purposes: demonstration of automatic transit for urban applications, and transportation from a remote parking lot to the airport terminal. The 0.7 mile guideway includes both at-grade and elevated sections. A 550 ft bypass at the intermediate station simulates an off-line passenger terminal. Provisions for extension of the guideway to serve future facilities have been included. The two 25 ft long vehicles are each powered by two 60 ph electric motors. An on-board computer controls the operation of the vehicle. The vehicles are air-conditioned and have two-way communication capabilities. Design of the guideway began in November 1973. Construction of the guideway was begun in July 1974 and was essentially complete in December 1974. The construction was completed in April 1975 when the system was energized and testing begun.

Spaulding, JJ (Connecticut Department of Transportation)  
Connecticut Department of Transportation SAE 750627

01 131261

**REPORT ON THE INTRODUCTION OF A RAPID REGIONAL TRANSIT SYSTEM TO SERVE MONTREAL'S MIRABEL AIRPORT (TRRAMM) [Rapport sur l'implantation d'un système de TRRAMM (Transport Rapide Régional Aeroportuaire Montreal Mirabel)]**

No Abstract. [French]

Ministry of Transport, Canada 1974, 106 pp, Figs.

## ACKNOWLEDGMENT: UIC

ORDER FROM: Ministry of Transport, Canada, 1000 Sherbrooke Street, West, Montreal, Quebec H3A 2R3, Canada

01 132054

## PERSONAL RAPID TRANSIT-HUMAN AND ENVIRONMENTAL SYNTHESIS

The Ford Motor Company's automatically controlled transportation system now installed in the Fairlane Town Center in Dearborn, Michigan and Bradley International Airport, Hartford, Connecticut, represent a coming together of a host of proven technical disciplines which form a mode of transportation that can move people effectively and efficiently within a confined urban setting. This paper reviews the design parameters of Ford's automatically controlled transportation (ACT) from the viewpoint of the traveling passenger and from the visual impact the system has on the surrounding environment in which it must live.

Conference, Automotive Engineering Congress and Exposition, 23-27 February 1976, Detroit, Michigan.

Gollwitzer, WH (Ford Motor Company)

Society of Automotive Engineers SAE 760251, 1976, 6 pp, Figs., Photos.

ACKNOWLEDGMENT: Highway Safety Research Institute (HSRI-33830)

01 134030

## DIRECT CONNECTING RAMPS TO AND FROM MAJOR TERMINALS

The direct connecting ramps between freeways and major terminals such as airports, waterfront areas, stadium and shopping centers were studied and recommendations for such facilities were developed. Only ramps connecting full access control freeways to major terminals with not more than one intermediate connection between freeway and the terminal were considered in this study in which questionnaires were sent out to state and foreign governments and agencies. Responses provided information on 61 facilities. The resulting data were tabulated by population groupings to determine the relationship of the population density to the location and type of generator. Information was obtained relative to which agency suggested construction of the direct connecting ramp facility, and which agency designed, constructed and maintained it. Operational features are discussed, and legal problems in planning and construction are considered. The basic criteria for justification for a direct connecting ramp are considered, and aspects such as purpose, traffic volumes, safety, socio-environmental factors and cost-effectiveness are discussed. The design of direct connecting ramps is also covered.

*Traffic Engineering* Vol. 45 No. 12, Dec. 1975, pp 32-39, 5 Figs., 2 Tab.

ORDER FROM: ESL

01 135405

## AIRPORT USER TRAFFIC CHARACTERISTICS FOR GROUND TRANSPORTATION PLANNING

This report which is intended as a reference and guide for traffic engineers and others dealing with airport ground transportation, covers key traffic characteristics of air passengers, airport employees and air cargo, and examines aspects of airport access. The work which is intended to serve as a basis for more comprehensive studies of current design practices and supply input for development of improved analytic and design procedures, highlights significant data concerning airport user characteristics and considers resultant demands for ground transportation and terminal facilities. Some of the most significant findings relate to: the annual growth forecast for air travel; the variation in the proportion of "through" and "transfer" air passengers (and corresponding the variation in ground transport demand); transport to airport; passenger-related trips; air-cargo generated traffic; rail rapid transit airport access; transport by mass transit; airport highway access capacity; airport public parking; and on-airport transit systems on exclusive rights of way.

*Traffic Engineering* Vol. 46 No. 5, May 1976, p 46

ORDER FROM: ESL

01 147044

## COURSES ES 251-252-TRANSPORTATION, PROJECT E. TOPICS ON AIRPORT ACCESS IN THE WASHINGTON METROPOLITAN AREA, 1976

This document contains four articles concerned with planning and engineering concepts related to airport access. Section A analyzes the impact of the Washington National Airport Metro Stop on the entire system. Section B presents a staged recommendation for providing access to Dulles airport, employing several modes. Section C surveys the state-of-the-art of rapid rail vehicles and examines them for their applicability to airport access in the Washington Metropolitan Area. Section D presents three approaches to solving the problem of providing pedestrian access between National Airport Metro Stop and the Airport itself. The design parameters and costs of each component of the system are explored in brief, and recommendations for staging are coordinated with estimated demand.

See also PB-220074, PB-226829, and PB-244341. (PC A08/MF A01)

Cooper, T Cuming, D Siftar, R Stangas, P

George Washington University, National Science Foundation Final Rpt. ES-251-252-E, Apr. 1976, 171 pp

Grant NSF-HES72-07726

ACKNOWLEDGMENT: NTIS

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PB-258900/OST

01 147384

## SURVEY OF GROUND TRANSPORTATION PATTERNS AT THE DALLAS/FORT WORTH REGIONAL AIRPORT. PART I. DESCRIPTION OF STUDY

A survey of ground transportation at the Dallas/Fort Worth Regional Airport was conducted to obtain data for calibrating models of airport trip generation, at the airport. Due to the special nature of the data required for this purpose, significant modifications had to be made to the usual procedures of conducting access surveys described in previous studies. A separate survey was made of each of the three principal components of ground traffic at the airport: (1) air passengers and visitors riding in automobiles; (2) air passengers and visitors riding on public transportation (Surtran); and (3) airport employees. In addition, counts of passengers and vehicles were obtained for use in determining and expanding the sample. Detailed descriptions of the instruments and procedures used in each type of survey are contained in the report.

Prepared in cooperation with Department of Transportation, Washington, D.C. Office of Univ. Research.

Dunlay, WJ, Jr Caffery, TG Henry, L Wiersig, DW

Texas University, Austin, Department of Transportation Res Rpt. RR-15, DOT/TST-76/78, Aug. 1975, 91 pp

Contract DOT-OS-30093

ACKNOWLEDGMENT: NTIS

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PB-261352/9ST

01 152720

## AIRPORT ACCESS VOLUMES FROM AIRLINE SCHEDULES

A methodology is described for estimating air passenger and visitor automobile traffic volumes at an airport as a function of an airline flight time. The methodology allows for the estimation of inbound and outbound traffic volumes for any desired time interval as a function of airline flight arrival and departure times and probability distributions for the times that passenger automobiles enter and leave the airport relative to flight times. The total expected number of air passenger vehicles using the access facilities in a given time period is obtained by superimposing these probability distributions over all airline flights. Previous methods of measuring airport trip generation are reviewed. This is followed by a description of a 2-day travel survey conducted at the Dallas/Fort Worth Regional Airport (DFW) to obtain data for the model. Model estimates are compared with measured traffic counts in preliminary model validation.

Dunlay, WJ (Pennsylvania University, Philadelphia) Wierstg, DW  
*ASCE Journal of Transportation Engineering* Vol. 103 No. 1, 1970

ACKNOWLEDGMENT: EI

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01 155463

**GROUND ACCESS--THE KEY TO AIRPORT DEVELOPMENT**

Areas of (environment, land use planning, ground access) concern to the Los Angeles Department of Airports are briefly discussed, improvements to ground access to airports are listed, and solutions to the problem of providing ground access for about 30 million annual air passengers in the 1980's are outlined. Ground access improvements which have been completed or are currently underway are: a Center Way running east and west through the main parking lot to the central terminal area; airport radio traffic service which provides traffic and parking information to auto drivers; an additional traffic lane to the main traffic artery within the central terminal area; and a reduced rate park-and-ride facility. The problem of providing access for passengers in the late 1980's may be resolved in 4 ways: provision of a better way for short distance travellers; better use of other existing airports so that all traffic--short-haul, medium-haul, and long-haul--is not funneled through one airport; improvements to ground access at existing airports for example by double decking of the roadway; and dispersed or remote parking.

Proceedings of The Workshop: Air Transportation Demand and Systems Analysis.

Graham, J.L. (Los Angeles Department of Airports)  
Massachusetts Institute of Technology FTL Report 75-8, Aug. 1975, pp 142-150

ACKNOWLEDGMENT: Massachusetts Institute of Technology

01 155464

**AN ANALYSIS OF ACCESSIBILITY EFFECTS OF TERMINAL LOCATIONS AND CONFIGURATIONS**

The principal topic of this thesis is a positive analysis of the accessibility effects of the location and configuration (i.e. external functional organization) of transportation terminals for inter-city travel. This analysis centers on a parametric assessment of the influence of environmental and demand conditions upon accessibility to various terminal locations. Environmental and demand conditions considered are the geometry of the urban area, the spatial distribution of the origin and destinations of inter-city trips, and the magnitude and distribution of inter-city travel impedance. The principal conclusion of this parametric assessment is to demonstrate the influence of environmental conditions upon the shape and extent of "near-optimal" areas surrounding optimal terminals locations. Terminals located in these areas provides nearly the same accessibility as optimally-located terminals. This confirms that terminals can and should be located on the basis of other considerations in addition to accessibility. To provide the transportation analyst with a capability for analyzing complex terminal configurations, the SITECLU computer model (for: Systematic Investigation of Terminal Configuration and Locations in Urban Areas) was developed. SITECLU predicts consequences of specified locations and represents enter-city travel using abstract routing algorithms. In addition to predicting accessibility effects different configurations, SITECLU is also capable of comparing different configuration on the basis of the physical impacts that they exert. Potential and actual uses of those capabilities are demonstrated. The secondary topic of this thesis is an empirical analysis of the distribution of residential population in Metropolitan areas. An integrated computerized procedure was developed and data was collected sentential density equations were obtained. It was found density equations were obtained. It was found that, of many model formulations analyzed, the negative-exponential function was the most appropriate for representing density. It was also found that the estimation of density parameters and the degree-of-fit are insensitive to the location of the distribution center. Meaningful relationships were observed between land use and high prediction errors, directional density gradients, and between the distribution of population and that of demand for inter-city transport models.

Genest, B.  
Massachusetts Institute of Technology MS Thesis 1970, 627 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

01 155465

**GROUND ACCESS TO MAJOR AIRPORTS IN THE UNITED STATES: SUMMARY OF PRESENT CHARACTERISTICS AND EVALUATION OF FUTURE REQUIREMENTS**

The ground access problem at United States Airports is discussed in this report in general terms. Those characteristics of airport users relative to

ground transportation will be analyzed to provide a clear picture of the potential users of any transportation system to serve airports. The requirements of any total system to serve airport users will be defined and based on projections of future ground traffic, the suitability of various technological options will be discussed.

Munds, A.J.  
Massachusetts Institute of Technology FTL R68-7, 1969, 59 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

01 155473

**CURB SPACE AT AIRPORT TERMINALS**

This article presents methods of curb length computation at airports, analyzes factors which determine such lengths, and comments on considerations of curb design and cost. The simplest rule of thumb method relates the linear feet of curb space to some readily available measure of airport activity such as annual enplaned passengers, daily aircraft operations, or number of gates. A computer simulation can give a more realistic basis for such computations. In mathematical simulation either a given number of spaces is assigned the curb and the length of the queue is tabulated, or an unlimited amount of curb is assumed and the number of vehicles stopped at the curb at various times is tabulated. The requirements for accurate simulation are detailed. The details are discussed of statistical analyses which have the advantage of being useful both in preliminary planning and during the more detailed design stages. The factors (vehicle arrival rate, mean service time) required for curb length estimates are reviewed, and design and cost considerations are discussed.

Tillis, R. (Tippetts-Abbett-McCarthy-Stratton) *Traffic Quarterly* Vol. 27 No. 3, Oct. 1973, pp 563-582, 6 Fig., 5 Tab.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

01 155477

**THE APPLICATION OF LOCATION MODELS TO OFF-AIRPORT TERMINALS**

This paper attempts to extend the approach proposed by Kanafani to optimize travel time savings obtainable from terminals located in an idealized linear city and to apply the resulting models to a case study. Only the location problem is dealt with in this paper and, for that, only travel-time savings obtained by connecting the terminal to the airport with an exclusive mass transit system are considered. The models developed here are intended to assist in the design of such a system by responding to the following questions: At what speed should the transit links connecting the airport and the terminals be operated? What is a good location for each terminal? Need we be concerned with precise terminal locations as long as they are reasonable? If the terminals are located on the basis of a particular link speed, will the locations still be good if the link speed is changed? Must we be concerned with possible future expansion of the number of terminals in the system when making present locational decisions? How many terminals should there be in an off-airport terminal system? A model strategy using idealized representations of the off-airport terminal systems and the cities they serve was adopted. A small number of variables are considered and some continuum approximations that permit the use of simple differential calculus in arriving at optimal locations are adopted. The advantage of this approach is that the influence of each factor considered in the model is readily discernible. The disadvantage is that the model is inevitably a highly stylized representation of any practical case to which it is applied. In the model the assumption is made that benefits accrue only as time savings to users and that the amount of time spent at a terminal is the same for each user. It is also assumed that a terminal may be located anywhere within the city, that the speed of travel on the system transit links is uniform, that the link routes must follow the orientation of the city transportation route network, and that the speed of travel on this city network is also uniform.

Poulton, M.C. (British Columbia University, Canada) Kanafani, A.  
(California University, Berkeley) *Transportation Science* Vol. 9 No. 3, Aug. 1975, pp 224-247

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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01 155482

## AIRPORT ACCESS-A CASE STUDY APPROACH

The primary purpose of this thesis is to develop a case study concerning airport access for use in MIT's Urban Transportation Laboratory-an undergraduate course in MIT's Department of Engineering. The first step in the case study analysis is the establishment of a base case simulating the airport access movements of resident and non-resident air passengers and airport employees on the major modes serving Logan International Airport in a given reference year. This flow patterns is then tested with respect to its sensitivity to changes in the demand model parameters. The next step in the analysis is the simulation of the projected airport- destined flow pattern in a target planning year, assuming no major changes in the access network. The projection simulation then serves as a benchmark with which to compare various policy and technology access options. One such option is evaluated in the case study. The last of designing and evaluating other alternatives is left to the students as a final assignment in the Urban Transportation Laboratory course. The case study also raises some of the issues involved in modeling airport access. In particular, the problems of modelling. Airport access demand, and tracing the effects of airport accessibility on air trip generations are discussed.

Sherman, L.  
Massachusetts Institute of Technology 1971, 237 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

01 155483

## AN ANALYSIS OF THE DESIRABILITY OF SATELLITE TERMINALS TO IMPROVE AIRPORT ACCESS

Satellite terminals are described and possible nonquantifiable advantages accruing to satellite users such as convenience are briefly discussed. A method for analyzing the usefulness of satellite terminals is then developed which concentrates on total access trip time as a measure of level of service. Analysis are distributed on a least-time basis either to satellites or directly to full-service terminals where they obtain intercity transportation. The total access trip is divided into several time components corresponding to initial access time to the terminal and performance measures which are related to travel impedances associated with terminals. Trip time data on the operation of terminals is used to determine benchmark values for the performance measures. A computer system developed by another researcher for the systematic investigation of terminal locations and configurations is used for the travel time analysis. By varying the relative values of the performance measures and observing the resulting changes in trip distributions, issues are explored which relate to the importance of terminal impedances, the Capability of Vertical Takeoff and Landing (VTOL) Aircraft and High Speed Ground Transportation (HSGT) to provide significant time savings, and the perceived as opposed to actual amount of time required for a trip. Findings indicate that under certain conditions, satellites do provide access time savings for some travelers and that many alternatives in addition to VTOL and HSGT exist for improving airport access.

Leder, WH  
Massachusetts Institute of Technology MS Thesis 1970, 132 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

01 155484

## ACCESS TO AIRPORTS: 4 REPORTS

The problem of providing ground access to airports in large metropolitan areas discussed. The first step in analyzing the problem of access to airports is an evaluation of the location and characteristics of the demand for air travel. In the first paper, Whitlock and Cleary present past trends in intercity passenger travel including door-to-door travel times, freight movements, user mix, and hourly variations. Also, air passenger traffic is forecast and passenger/vehicle relationships are explored. Next, Silence describes the Federal Highway Administration's analysis of the access problem. A study is presented of the average travel times under differing traffic conditions for the major hub airports across the country. Lardiere and Jarema forecast future demand for air travel, both in aggregate and for hub airports, and the effects of such demand are discussed in relation to ground transportation needs. Because of the dispersal of origins and destinations of airport-oriented traffic, highways will continue to provide the principal means of access. In the fourth paper, Corradino and Ferreri report on an origin/destination study of air passengers at Philadelphia International Airport that reaffirmed the high dispersal of trip origins and destinations. The airport access

problem described here is only one facet of the total airport facilities problem and as such cannot be resolved by itself.

Whitlock, EM Cleary, EF (Smith (Wilbur) and Associates) Silence, SM (Federal Highway Administration) Landiere, SA (Federal Aviation Administration) Jarema, FE (Federal Highway Administration) Corradino, JC Ferreri, MG (Simpson and Curtin Incorporated) *Highway Research Record, Hwy Res Board* No. 274, 1969, 43 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

01 155492

## THE DEMAND FOR AIRPORT ACCESS SERVICES

This study reports on a long-term effort to define the characteristics and patterns of behavior of airport access travels and, most particularly, their potential response to changes in the nature and quality of airport access service. The immediate objective was to develop and validate models of the demand for airport access trips so that airport planners would effectively predict the volume of traffic for new services and, thus design these services effectively. This study also illustrates practical ways to validate the predicative power of models of trades demand and, by example, indicates some of their difficulties.

de Neufville, R (Massachusetts Institute of Technology) *Traffic Quarterly* Vol. 27 No. 3, Oct. 1973, pp 583-600

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

01 155495

## AN AIRPORT ACCESS DEMAND STUDY

This thesis considers the airport access subsystem with particular reference to the behavioral characteristics of users of the system. Two separate but interrelated surveys of a New York City area suburban limousine service were performed to provide data by analysis in this light and additional data for company limousine travellers with general airport travellers. The results of the first survey were used to develop two models of travel behavior: one an aggregate formulation, the other a disaggregate formulation. The models results emphasized, respectively, the high sensitivity to costs of airport travelers and the importance of auto availability in determining airport access modal choice. The aggregate model was employed in policy formulation. The second survey indicated that positive and expected results followed this process. Analysis of the effects of auto availability in airport travel indicated that public transportation models are considered generally after private models are investigated by a potential passenger. Finally the relevance of the results of the planning of access systems is discussed, with particular reference to the cost sensitivity of airport travellers.

Koller, P Skinner, RE  
Massachusetts Institute of Technology 1971, 188 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

01 155497

## ADVANCED TRANSPORT SYSTEMS FOR AIRPORTS

Electrically propelled people movers which use a track system and are highly flexible in operation have been used successfully in the rapidly expanding older airports. The system's flexibility is achieved through computer control and the use of small transportation units.

Allen, R *Airport Forum* Vol. 2 No. 4, Dec. 1972, pp 86-94

ACKNOWLEDGMENT: Massachusetts Institute of Technology

01 155528

## PUBLIC PARKING AT PORT AUTHORITY AIRPORTS

The demand characteristics for 1972 are discussed, and pertinent statistics are tabulated and discussed. The spaces available at an airport are compared with absolute peak demand, and comments are made on forecasting parking space needs. It is noted that the single most important factor in forecasting space needs is long term auto storage.

From Airport Economic Planning by G.P. Howard.

Hurst, F (Port Authority of New York and New Jersey)  
Massachusetts Institute of Technology Press 1974, pp 230-244

ACKNOWLEDGMENT: Massachusetts Institute of Technology

01 155531

**AIRPORT ACCESSIBILITY IN THE SAN FRANCISCO BAY AREA**

The purpose of this report is to provide an accounting of efforts undertaken in preparing an airport accessibility study. The report further acts to initiate recommendations as requested by the California legislature. The report also offers potential for improving coordination between various elements in the adopted Regional Transportation Plan. Characteristic of this study objective are analytical and empirical measurements detailing the ability of existing and planned ground transport facilities to serve passenger, cargo, employee, and other airport related accessibility requirements of air transportation centers in the Regional Airport System. The merits of this objective will be recognized by local, regional and state agencies in their efforts to evaluate access facility service levels, the impact of alternative travel modes, and the extent to which ground accessibility must be developed to meet future air travel demand at each of the regional airports. The broader purpose for the report is to identify accessibility factors which should be considered in airport planning. The study emphasizes existing and future requirements at 3 major airports: San Francisco International Airport Metropolitan Oakland International Airport, and San Jose Municipal Airport.

Negrette, AJ

Metropolitan Transportation Commission 1974, 126 pp

ACKNOWLEDGMENT: Port Authority of New York and New Jersey

01 155533

**DULLES AIRPORT RAPID TRANSIT. STUDY**

The papers collected in this volume explore various aspects of the feasibility of a high-speed transit service between downtown Washington, D.C. and Dulles Airport, with the following objectives and constraints: (a) Travel Time and interfacing should be such as to give Dulles a level of accessibility comparable to that of National. (b) Longitudinal accelerations should not exceed about 0.1g, and sensed transversal accelerations should be minimal. (c) The guideway must be enclosed, to protect the vehicle from flying objects, from vandalism, and from the elements, and to shield the environment from noise. (d) Adverse environmental impacts of the system along its entire route must be minimized. (e) The system should lend itself to some utilization for cargo movement. (f) Interference between passenger and cargo movements at the airport should be minimized. The route selected is one that utilizes, for the most part, existing rights of way, and the calculated velocity schedule provides a 10-minute total travel time.

Claveloux, BA

George Washington University 1973, 267 pp

ACKNOWLEDGMENT: Port Authority of New York and New Jersey

01 155534

**AIRPORT SATELLITE TERMINAL LOCATION USING HEURISTICS**

This report focuses upon two airport problems--terminal and access congestion. Airport planners and operators recognize the existence of these problems and have attempted to keep pace with the increasing traffic by building larger terminals and access highways. However, limitations in the capacities of such systems have forced new concepts to be proposed. One such concept is the construction of satellite terminals throughout the area served by an airport. This thesis examines a satellite system for Washington's National and Dulles Airports and describes the determination of the number and location of such terminals. A heuristic method was selected and an algorithm developed which minimizes the investment cost of providing adequate terminal and access system capacity. A dropping procedure was used in which a satellite station is assigned to each potential location, and those stations which were not economically sound were systematically eliminated. Passengers would pay their own fare in this system which makes the transportation cost equal to zero. It was therefore necessary to modify existing heuristic programs so that this particular situation could be evaluated.

Spilseth, G

George Washington University Feb. 1971, 94 pp

ACKNOWLEDGMENT: Port Authority of New York and New Jersey

01 155541

**ACCESS TO AIRPORTS; AN APPLICATION OF DTEM**

This report describes the application of DTEM to the study of highway access to major airports in the tri-state region. The airports were studied individually and in completion with each other, in those situations: 1. Existing highway system; three airports. 2. A 1990 highway system; five airports. 3. A 1990 highway system; four airports. The 1990 system was created for study purposes only, and did not represent an official highway plan. The results show that: 2. About 82 percent of the regional population is within an hour's travel time of at least one major airport. 3. Mid-Manhattan is most accessible to LaGuardia but is within an hour of all three airports. 4. The pattern of planned development by 1990 causes the Newark tributary area to gain 9 percent of the regional population. 5. The addition of a fourth major airport in the vicinity of Newburgh in Orange County would place 13 percent of the 1990 population in its tributary area, diverting 10 percent from LaGuardia and 3 percent from Newark. 6. Without the fourth airport, about 77 percent of the 1990 population would be within an hour of a major airport; with it, 89 percent. 7. The distribution of flights among the airports as scheduled by the airlines was a stronger influence than accessibility, on the distribution of passenger trips among the airports.

Jordan, D

Tri-State Regional Planning Commission June 1974, 13 pp

ACKNOWLEDGMENT: Port Authority of New York and New Jersey

01 155548

**RAPID TRANSIT AND THE PUBLIC INTEREST: A CASE STUDY OF THE SAN FRANCISCO PENINSULA**

The original BART system was developed to encourage land development, but advertised to the public as a means of reducing auto congestion. During the construction of BART, its administration has been unable to successfully control costs or respond effectively to criticism or to local concerns. The methods used to subsidize BART (sales and property tax) are considered to be among the most regressive taxes. BART expansion on the Peninsula was conceived in order to facilitate BART extension to the San Francisco Airport. While serious questions remain to be answered before BART is extended to the airport, even more problems exist in the current plan to extend BART to Palo Alto. The San Mateo County Transit Development Project which studied transit improvements on the Peninsula eliminated the possibility of exploring options other than BART extension and then failed in its attempts to involve citizen participation. The resulting plan was developed to maximize its development potential, which would result in the destruction of low-income housing and small businesses along the system's path. New development would reverse a zero population growth trend in San Mateo county. The cost of BART in San Mateo county is not only underestimated, but cannot be met even given the most optimistic predictions of federal assistance. BART expansion to Palo Alto could not be completed before 1984. Present plans would result in abandonment of Southern Pacific service south of BART, thereby reducing transit service in Santa Clara County.

Lewin, G

Stanford University 1974, 78 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

01 155549

**AIRPORT ACCESS STUDY: FRIENDSHIP INTERNATIONAL AIRPORT**

This study indicates that the most attractive method of providing rail access to Friendship International Airport from the metropolitan centers of Washington and Baltimore, Md. would be through the implementation of a high-speed electric service running directly to a new railroad terminal at the Airport from Union Station in Washington and Camden Station in Baltimore. Use would be made of existing Penn Central and Baltimore and Ohio Railroad routes and facilities, with a connection between the two at Winans and an additional track on the Penn Central.

Gibbs and Hill, Incorporated Sept. 1970, 202 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology



01 155556

## A MASS TRANSIT MAN LOOKS AT THE FUTURE OF AIRPORT ACCESS

Alternatives to the private automobile are discussed and the advantages of buses and aircraft are considered. The advantage of using any system of public transportation is noted and the potential for reducing the trend towards permanent public subsidy is pointed out. Comments are made on the fixed guideway system, and the principal advantage of buses and aircraft over other means of airport access is that little or no new construction is required to occur. Where additional facilities are needed, such as downtown terminals or facilities at outlying airports, the additional construction is limited to the terminals itself and much of the work could be supported by the airlines which use the facility. An advantage of using any system of public transportation, is the distribution of the traffic load associated with well-wishes and welcomes. The promotion of adequate economical public transportation to the airport is urged.

Fowler, WK (Florida Department of Transportation) *Airport Services Management* Vol. 16 No. 2, Feb. 1975, pp 16-18

ACKNOWLEDGMENT: Massachusetts Institute of Technology

01 155561

## AIRPLANES, AIRPORTS, ND ACCESS-BETTER BALANCE IS NEEDED

This article which notes that better balance should be achieved by putting more emphasis on access and novel systems while limiting airport sprawl, discusses Dulles as an example of a systematic approach to terminal design, and quotes from a terminal expansion study which considered the costs of 6 mobile lounge designs. The latter study concerned the economics of terminal expansion at JFK and Miami strictly from the point of view of the airline's capital investment and operating costs. The study which also considered the amenities for the passenger, concluded that the mobile lounge permits 25 to 30 percent less building construction than conventional terminal solutions, with comparable savings in initial facilities expenditures. The specific problems at O'Hare airport are mentioned, the operations at Dulles are described, and comments are made on the problems of using airplanes for hauling cargo and of airport access from downtown. A dual-mode vehicle system for delivering passengers to the aircraft, and a vehicle-guideway-control-operations system that has small electrically powered automobiles are also described.

Weinberg, MI (Cornell Aeronautical Laboratory, Incorporated) *Astronautics and Aeronautics* Apr. 1970, pp 52-60

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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01 155564

## NEW YORK AIRPORT ACCESS DEMAND STUDY

This thesis considers the behavioral characteristics of certain users of the airport access system. Two separate but related surveys of two New York City area airport coach operators were conducted to provide data for analysis and comparison. The results of the survey by a Transportation Company were used in conjunction with data provided by the Port of New York Authority, to develop a model of travel behavior. For the passengers used in the calibration process, the model showed a greater resistivity to changes in price than to changes in time, in agreement with previous used in this area. The model was then used to predict patronage. A previously developed model was used in an attempt to predict patronage following several important operational changes (fare, frequency, and equipment) on this route. Finally the conclusions and implications to be drawn from the data and the models are discussed.

Yaney, JC  
Massachusetts Institute of Technology 1972, 124 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

01 155588

## AIRPORT ACCESSIBILITY AND URBAN TRAVEL, THE LINKAGE BETWEEN AIR TRAVEL AND URBAN TRANSPORTATIONS

The demand generated by airports and the expanding worked served by air transportation are discussed, and the characteristics of airport trips are noted. The courses of airport inaccessibility and ways of improving

accessibility are examined, and the need for a truly effective planning process for coordinating airport developments with all their functioning urban elements is noted. At airports serving large cities, daily population frequently exceeds 100,000, generating at least 150,000 trips throughout the urban area. It has been found that less than half of the airport population are air passengers and that less than one-third of the airport population originate or terminate their trips in the central business district. The surface trips generated per person and the peaking characteristics of airport trips are discussed. Some of the improvements now being implemented, planned or experimented (exclusive expressway, rail rapid transit, V/STOL or helicopters etc.) will contribute to the improvement of urban travel, and some will not. It is pointed out that the effectiveness of airport planning and coordinating activities is dependent on workable participation by all local governments in the metropolitan areas.

American Automobile Association May 1970, 36 pp

ACKNOWLEDGMENT: Federal Aviation Administration Library

01 155597

## AIRPORT ACCESS-A PLANNING GUIDE

The organization and financing of airport access studies appear to be unique in each application. Financing sources range from the Federal Government with support from communities or local transportation agencies to the airport owner/operator. Regardless of the source of financing, a consistent and broad set of goals and objectives should be defined and analyses undertaken to evaluate the impacts of system and operational alternatives on the users, the community, and the organizations involved. Unless the financial implications and potential benefits are clearly defined, it will be difficult to implement the recommendations. Even a clear or reasonably accurate statement of impacts will not guarantee implementation, since the value structure of the private or public sector agencies, as measured by the definition of priorities and allocation of revenues, are influenced by institutional factors and may be different than the values structures of the community at large. Also, budgeting or resource-allocation considerations of potential implementing agencies may span a broader or different set of objectives. This set may be completely consistent with the role of the implementing agencies.

Federal Highway Administration, Peat, Marwick, Mitchell and Company  
Oct. 1971, 20 pp

ACKNOWLEDGMENT: Federal Aviation Administration Library

01 155611

## AIRPORT ACCESS STUDY: IMPACT OF AIRPORT-ORIENTED VEHICLE TRIPS ON HIGHWAY FACILITIES

The highlights are presented of a study which was accomplished using existing urban transportation study data files and computer programs available from the Federal Highway Administration. Four urbanized areas were selected for the study: Birmingham, Alabama-Boston, Massachusetts-Louisville, Kentucky and Minneapolis-St. Paul, Minnesota. For each selected area, two standard transportation planning files were obtained; that is, 1. A "link-data" file describing the characteristics of the highway network (link distance, speed, volume, capacity, etc.) 2. A "trip-record" file describing the characteristics of all trips made within the study area (trip origin, destination, mode, etc.) For each selected area the "link-data" file was used to build a computerized model of the highway network. The resulting "network description" was then used as input to an existing computer program to build minimum time paths from each node in the network to every other node. These minimum time paths or "trees" were then "skimmed" to obtain the traveltime between each pair of traffic analysis zones. The "trip record" file was processed to produce a matrix of zone-to-zone vehicle volumes. The resulting "trip table" was further processed to produce a summary of total vehicle trip-ends by traffic analysis zone. The total vehicle trip table was used in conjunction with the network and tree files to "load" total vehicle trips onto the highway network. The resulting "loaded network" was further processed to produce average daily, directional link volume and vehicle-mile information relative to total vehicle trips made within the study area. In addition, the total vehicle trip table and the skimmed tree files were used to generate a total vehicle trip length frequency distribution. The total vehicle, network and tree files were again used to load the highway network; however, this time only vehicle trips having an origin at the airport zone (this is the zone in which the airport was located) were loaded onto the highway network. The resulting loaded



network was again further processed to produce average-daily directional link volume and vehicle trips having an origin at the airport. The term airport will refer to the zone in which the airport is located for the remainder of this report. Also, trip length frequency distribution information for vehicle trips having an origin at the airport was generated. The data generated as a result of the above process were then analyzed and subsequently summarized by five major categories: Trip, vehicle-mile, trip length, link and geographic orientation. A great deal of information relative to the characteristics of airport-oriented vehicle trips was produced as a result of this study. Much of these data are tabulated and presented in the results and appendix sections of this report.

Comsis Corporation July 1972, 42 pp

ACKNOWLEDGMENT: Federal Aviation Administration Library

01 155613

#### THE AIRPORT. ACCESS BY AIR AND LAND

This symposium considered problems which are centered on the airport: on its setting, its location and its role. They are related to the characteristics of the air transportation industry and can be defined under six main headings: congestion, distance, number of airports, environment, cost and role. Congestion before and after the airport. The saturation of airspace and the congestion of surface links affect air transport in terms of time, regularity and financial costs. Compared with other transport media, they may also create a handicap if urban, suburban and regional extensions are not adequately drained and irrigated by convenient services. The dispersion of points and zones involved adds to the complexity. The increasing distance between cities and airports which are cut off from their economic and demographic context and lose in efficiency and integration in daily life what they gain from the technical viewpoint. An environment affected by disturbances-particularly noise-which are tolerated less and less. Increasing the number of airports, either to serve major cities or equip a region or country; diversification gives obvious advantages but poses problems concerning traffic distribution, operation and frequencies, investment and land acquisition.

Presented at the 5th ITA Symposium.

Institute Transport Aerien 1972, 190 pp

ACKNOWLEDGMENT: Federal Aviation Administration Library

01 155624

#### POMONA TO GET TRANSIT TEST LINE

An automatic transit system for the new Dallas-Ft. Worth regional airport of Arlington, Tex., will be tested in the Los Angeles area this year. The actual installation will be at the L.A. County Pomona fair grounds and include a life-size test guideway about 1,200 ft. long with connecting spur and passenger station to facilitate rapid transit between the fair grounds with its spacious parking facilities and downtown Pomona. Two passenger vehicles with combined seating and standing capacity of 30 each will be placed in operation over the system under simulated airport conditions. The tests will cost more than \$560,000 and are designed to permit evaluation of the Dashaveyor as an airport rapid transit system. The test vehicles will be operated under automatic control and are planned to demonstrate vehicle safety, acceleration, deceleration, jerk rates, controlled stopping, loading and unloading of passengers (including vehicle door operation), and service and emergency braking. The Dashaveyor system, originally developed to carry ore and mine personnel in rugged service, has been adapted to carrying people, cargo and solid waste. It is fully automatic; powered by electricity; locked in a guideway of dual rails; relatively silent and smog free; protected by electronic watchdog control and capable of running on, over or under any surface. It is said to be the only transit which can be operated horizontally like a train, vertically like an elevator or at virtually any angle of descent or climb like a conveyor belt. A 5.5-mile mining version is already in operation after extensive testing at the Copper Range Company's mine near the town of White Pine, Mich.

Railway Age Vol. 168 No. 12, June 1970, p 13

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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01 155629

#### AEROSPACE FIRMS DESIGN CARS FOR LOS ANGELES TRANSIT LINK

This article discusses designs for tracked air cushion vehicles on their linear induction motors for a 150-mph, electrically-powered elevated transit link between San Fernando Valley and Los Angeles International Airport.

Himmel, NS *Aviation Week and Space Technology* Vol. 92 No. 24, June 1970, p 18

ACKNOWLEDGMENT: Massachusetts Institute of Technology

01 155638

#### RESEARCHING FOR ROSKILL

This article summarizes various rail-and road-access studies for the third London Airport.

Flight International Vol. 97 No. 3186, Apr. 1970, pp 546-547

ACKNOWLEDGMENT: Massachusetts Institute of Technology

01 155655

#### HIGH SPEED GROUND TRANSPORTATION AIRPORT ACCESS ROUTE STUDY

The construction of a grade separated High Speed Ground Transportation System (HSGT) employing tracked air cushion vehicles (TACV) and linear induction motors (LIM) is physically feasible between LAX and a site near the Van Norman Lakes in the San Fernando Valley, via alignment mostly within the right-of-way of the San Diego Freeway. Speed restrictions are imposed on the HSGT limiting operations to less than 150 mph through much of its route. A primary objective in the study of the freeway alignment was to develop a route permitting a design speed of 150 mph. This speed was able to be attained in two sections of the preferred alignment described herein. It was determined that planning should proceed on the basis of double U-shaped guideways of given dimensions. Tradeoffs between span length and number of foundations resulted in a tentative guideway span of approximately 100 feet. A satisfactory structural system has been developed employing mostly cast-in-drilled-hole piles, concrete pile caps or concrete spread footings, concrete T-columns and concrete guideways spanning between the T-columns. T-columns are replaced by straddle bents where required over freeways or over freeways ramps. Three passenger stations are proposed for initial construction of the 16.4-mile route. 1,500 volt direct-current electrification system was selected for costing purposes. Power was proposed to be distributed to the vehicles through composite aluminum and steel contact rails. Travel time over the 16.4-mile route from the LAX Station to the San Fernando-South Station would be about 11 minutes with an average speed of approximately 89 mph. Speeds between the top speed of 150 mph and 100 mph would be achieved for a distance of approximately 46,000 feet. The effect of the proposed HSGT on freeway traffic would be minimal and no foreseeable serious safety problems would be created by the HSGT.

Kaiser Engineers Sept. 1970, 30 pp

ACKNOWLEDGMENT: Air Transport Association of America Library

01 155656

#### POTENTIAL OF ABANDONED RAIL RIGHT OF WAY AS MEANS FOR AIRPORT ACCESS

This paper discusses why railroad rights of way linking airports in hub regions by means of dispersed collection and distribution points in urban and suburban areas for processing passengers and their baggage is posed as a potential solution to the critical airport processing and access problem. The creation of a Federal Land Bank to hold in escrow abandoned railroad rights of way and to obtain land outside of metropolitan areas for new large airports is recommended.

Koomanoff, FA (Voorhees (Alan M) and Associates, Incorporated)  
Society of Automotive Engineers Apr. 1969, 8 pp

ACKNOWLEDGMENT: Air Transport Association of America Library

01 155661

#### IMPROVING ACCESS TO NEWARK AIRPORT

A number of alternatives which would connect downtown Newark to the airport terminal were studied, and 8 of these were selected for deeper

investigation. Substantial work was carried out in estimating the potential travel and construction costs of these systems. All but 2 of the alternatives involve significant improvements in rail routes near the airport, and would require elaborate engineering studies and substantial construction time to develop. For this reason the report recommends immediate action to provide an improved and regularly operated bus shuttle service which would connect the major downtown rail terminals, as well as the central business district to the old airport, and later to the new one.

Hesse, JE (United Aircraft Research Laboratories)  
Tri-State Regional Planning Commission Feb. 1969, 20 pp

ACKNOWLEDGMENT: Air Transport Association of America Library

01 155674

## A NETWORK ANALYSIS OF AIRPORT ACCESSIBILITY IN SOUTH HAMPSHIRE

This analysis addresses the need for improvement (1) in the techniques of analysis of the major locational forces such as surface accessibility; (2) in the aids to "sieving" of sites. Accessibility studies are discussed where the load system is considered a binary system where the roads themselves form links, while airport sites and city centers, as well as crossroads form the nodes of the network. The whole system is thus reduced to linear graph and is amenable to graph theoretic techniques using matrix algebra. The purpose of operations performed upon this graph is to build up a more accurate series of accessibility surfaces in which the links or the nodes can be weighted by considering not only road travel times but the importance of link and node in terms of their use by adjacent airport users. In this study, weighting was applied to the links. Data requirements for this analysis are rather severe and data availability was a constraint upon the analysis. The details are given of the study methodology and layout.

Armstrong, HW *Journal of Transport Economics and Policy* Vol. 76 No. 3, Sept. 1972, pp 294-307

ACKNOWLEDGMENT: Massachusetts Institute of Technology

01 155677

## GROUND TRANSPORTATION TO AIRPORTS

The subject of ground transportation to and at major air carrier airports has attracted much attention of transportation planners and airport authorities. In spite of many interesting studies few, if any, new or innovative airport access systems have been developed. There are various modes available for the transportation of people and goods to and from airports and within the airport terminal complex. Presently, the most widely used vehicle for airport travel in the United States is the private automobile. However, energy and resource constraints may very well, in the long range future, improve the viability of public transportation and rapid transit facilities as a means of airport access. The optimum ground transportation system for a particular airport will depend primarily on characteristics of the airport market area and of air travelers, an airport layout and on the type and level of ground and air transportation services offered. Modern planning practices once the programs of federal agencies favor into-modal approaches to the solution of transportation problems. They will ultimately result in better utilization of advanced public transportation systems by people and goods for airport and air service access.

Kurz, JW (Boeing Company) *High Speed Ground Transportation Journal* Vol. 9 No. 1, Apr. 1975, pp 503-513, 1 Tab., 14 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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01 155680

## PATRONAGE AND REVENUE ESTIMATES FOR THE SAN FRANCISCO AIRPORT ACCESS PROJECT

In many cities around the world concurrent growth of air transportation and congested urban development around airports have created an urgent need for fast, reliable, and safe ground access between airports and areas which they serve. This paper discusses a particular aspect of ground access for San Francisco International Airport—an extension of the San Francisco Bay Area Rapid Transit System for about 10 miles (16 kilometers) from its existing terminus at Daly City. Background for the problem, the approach to solving it and one major aspect of the solution thus far, the development of patronage and revenue estimates, will be described.

Altshuler, E (Tudo Engineering Company) Lathrop, WH (Parsons, Brinckerhoff, Quade and Douglas, Inc) *Traffic Quarterly* Vol. 27 No. 1, Jan. 1973, pp 65-76, 1 Fig., 9 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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01 155682

## AIRPORT ACCESS VOLUMES FROM AIRLINE SCHEDULES

A methodology is described for estimating air passenger and visitor automobile traffic volumes at an airport as a function of an airline flight time. The methodology allows for the estimation of inbound and outbound traffic volumes for any desired time interval as a function of airline flight arrival and departure times and probability distributions for the times that passenger automobiles enter and leave the airport relative to flight times. The total expected number of air passenger vehicles using the access facilities in a given time period is obtained by superimposing these probability distributions over all areas flights. Previous methods of measuring airport trip generation are reviewed. This is followed by a description of a 2-day travel survey conducted at the Dallas/Fort Worth Regional Airport (DFW) to obtain data for the model. Model estimates are compared with measured traffic counts in preliminary model validation.

Dunlay, WJ, Jr (Texas University, Austin) Wiersig, DW (Pennsylvania University, Philadelphia) *ASCE Journal of Transportation Engineering* Vol. 103 No. TE1, SAE 12659 Proceeding, pp 143-156, 5 Fig., 20 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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01 155687

## AIRPORT ACCESS PLANNING IN CALIFORNIA

The development of a comprehensive data base in the planning process is essential for a fully-responsive and efficient ground access system. The evaluation of alternative system concepts to improve traffic flow, requires detailed information relative to type, magnitude, location and duration of vehicle traffic associated with air passengers in order to optimize the effectiveness of the proposed traffic solution. In addition, the traffic associated with adjacent industrial, commercial, cargo, service and maintenance facilities needs to be identified and catalogued. Once the individual elements of the ground transportation system can be identified, candidate transportation improvements which have the potential to solve the identified deficiencies can be developed. Without the careful identification of the type and characteristics associated with each of the three elements of the ground transportation system, it is impossible to develop appropriate ground access solutions for changing airport requirements.

Sheppard, WV (Smith (Wilbur) and Associates) *Traffic Engineering and Control* Vol. 17 No. 5, May 1976, pp 198-201, 5 Fig.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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01 155697

## AIRPORT SURFACE TRAFFIC DEMANDS

Statistics are presented which show that the New York area will experience a large part of a spectacular increase in air transportation in the 1970-1980 decade, and the two principal components (air-passenger generated traffic and employee traffic) of airport surface traffic are discussed in detail. Modal split in ground transportation is discussed and statistical data are used to explain the differences in modal usage of ground transportation at airports.

Bender, LE (Port Authority of New York and New Jersey) *Traffic Quarterly* Vol. 24 No. 3, July 1970, pp 351-360, 2 Fig., 1 Phot.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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01 155698

## RAPID TRANSIT AIRPORT SERVICE: THE KANSAS CITY CASE

This study attempts to test the concept that if it is possible to create a highly profitable transit service for the benefit of certain user groups, then, it is probable that this surplus could be used to subsidize transit service which must be maintained for social reasons and which is not profitable—such as transit for low-income areas. It is noted that only where specific rapid transit facilities operating on private rights-of-way are available can there be any



degree of certainty with respect to travel time between the point of origin and the point of airport destination. It is also noted that aside from the fact that minimizing transportation efforts through more rational land-use grouping and through communication should be considered an overriding objective in the commercial and social life of any community or region, it seems reasonable to substitute for the concept of universal service, a concept of special purpose service.

Roeseler, WG Icenogle, W (Kansas City Area Transportation Authority) *Traffic Quarterly* Vol. 24 No. 4, Oct. 1970, pp 485-501, 5 Fig., 2 Tab.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

#### 01 155716

##### AIRPORT CHOICE--AN EMPIRICAL STUDY

As a determinant of the air passenger's choice of airport, ground accessibility plays a more dominant role than air carrier level-of-service. Thus, the use of differential flight frequencies as a policy level to shift air passengers from one airport to another would have only limited potential. These conclusions are based upon an empirical study of air passengers' choice of airport in which a series of multinomial logit models were calibrated using air passenger survey data. These models relate the probability that a given airport will be selected to measures of ground accessibility and air carrier level-of-service associated with each available departure airport. A variety of measures for ground accessibility and air carrier level-of-service were tested in various combinations in models which consistently performed well from a statistical standpoint and in which the ground access measure was consistently the dominant variable.

Skinner, RE (Voorhees (Alan M) and Associates, Incorporated) *ASCE Journal of Transportation Engineering* Vol. 102 No. TE4, Nov. 1976

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

#### 01 155721

##### THE BALANCE OF TIME AND COST

In this paper an analysis is made of the total process and the factors which have led us to the current situation. Typical journeys will be broken down into time and cost elements and the balance between them will be examined. In view of the highly competitive situation, in the short haul market, between the air and surface transport systems--particularly with some of the advanced systems coming in the future, some means of assessing the relative attraction of transport systems is necessary. Thus the concept of total equivalent cost or "impedance" is introduced, where a value is put on time. Reduced "impedance" implies a greater market for any mode of travel and in a competitive situation the mode with the lowest "impedance" attracts the most traffic. Improved surface systems have, on certain routes, had a dramatic impact on the demand for air travel. Thus there is a need for the air transport system to be streamlined in order to maintain or improve its present share of the short/medium haul travel market. In the concluding sections of the paper the interrelationships between aviation technology, terminal and airport design and location are explored for both the conventional and possible longer term advanced air systems which could be in operation before the end of the century. Within the paper there is also a short discussion on the possible benefits of quiet aircraft in improving the availability and convenience of air transport.

Brown, DG (Hawker Siddeley Aviation) *Aeronautical Journal* Vol. 79 No. 779, Nov. 1975, pp 489-498, 25 Fig., 2 Tab., 4 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

#### 01 155738

##### PEOPLE MOVERS

A review of recently implemented public transit systems is presented. Among the projects described are the AIRTRANS system at the Dallas/Fort Worth Airport the Group Rapid Trans (GRT) system developed by the Boeing Aerospace Co. under the sponsorship of the Urban Mass Transportation Administration (UMTA) to link the two campuses of West Virginia University at Morgantown, and the Westinghouse, shuttle-loop transit system in use at several airports. Low-cost options to remedy urban transportation problems discussed include computer matching of car-pool riders, dial-a-ride and demand-response van and minibus services, and

allocation of freeway lanes to cars carrying more than three passengers. Prototype vehicles incorporating linear induction motors magnetic levitation techniques, under development by Boeing, Otis, and Rohr in a UTA-sponsored project to design an advanced group rapid transit system, are briefly described.

Mennie, D *IEEE Spectrum* Vol. 13 No. 7, July 1976, pp 85-89, 2 Fig., 2, Phot.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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#### 01 155760

##### ACCESS TO LOS ANGELES INTERNATIONAL AIRPORT--LANDSIDE RESTRAINTS

In examining the problems of access to Los Angeles International Airport, it was necessary to evaluate the freeway system as it exists today and the patterns that it will take in the future. Studies were made as to the total number of passengers that could gain access to the airport via the existing street system. It was determined that the figure of 24 million could be increased to 33 million by increasing surface connections from the north, south and west. Utilizing the figure of 33 million passengers, estimates were made as to how this figure might be increased by the completion of the freeway system to a total capacity of 56 million annual passengers.

From the Challenging Future. Proceedings of the 5th World Airports Conference, Brighton, England 5-7 May 1976.

Moore, CA (Los Angeles Department of Airports)  
Institution of Civil Engineers Proceeding May 1976, 3 pp

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-46540

#### 01 155761

##### THE CUSTOMER AND THE SURFACE PHASE OF AIR TRANSPORT

The ground aspects of air travel are considered along with the ground handling of air freight, the surface phase of air transport from the customer's point of view, questions of surface access to the airport, airport transit systems, airport ground speed, the balance of time and cost, the rationalization of ground services, and the relations between the airport and the charter passenger. Attention is also given to a user's analysis of airline ground problems, the interface problem as it affects the customer, the analysis and control of departing and arriving aircraft, and the organization of international airports.

Proceedings of the Spring Convention, London, England, 14-15 May 1975.

Royal Aeronautical Society Proceeding May 1975, 206 pp

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-35710

#### 01 155762

##### RAIL ACCESS TO MAJOR AIRPORTS

One of the most difficult problems faced by major airports in the future is likely to be the provision of adequate surface access and the interface with other transport systems. In this paper the need is examined to the increasingly to public transport to meet the requirements of surface transport in the future. It is shown that rail links have both attractions and drawbacks. The general worldwide aspects of the surface transport problem are illustrated by a discussion of the piccadilly underground extension to be opened in 1977 to the Heathrow Airport.

From the Challenging Future. Proceedings of the 5th World Airports Conference, Brighton, England, 5-7 May 1976.

Maxwell, WW Rockwell, EL (London Transport)  
Institution of Civil Engineers Proceeding 1976, 7 pp

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-46539



01 155830

## AIRPORT ACCESS--A LOOK AHEAD

Factors affecting landside capacity of airports are discussed, and the landside limitations of major U.S. airports are evaluated. Data are given on monthly variations in total air passengers and on the distribution of domestic air trips by trip purpose. An analysis of daily traffic flow to several major airports is presented. The roles of state governments the Federal Aviation Administration, the Federal Highway Administration, and the Department of Transportation in alleviating airport access problems are analyzed.

From International Air Transportation, Proceedings of the Conference, San Francisco, California.

Paullin, RL (Department of Transportation)

American Society of Civil Engineers Proceeding Mar. 1975, pp 207-226

ACKNOWLEDGMENT: International Aerospace Abstracts

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76A-10403

01 155843

## AIRPORT ACCESS VOLUMES FROM AIRLINE SCHEDULES AND EMPLOYEE WORK SHIFTS

No Abstract.

Fourth Annual Intersociety Meeting on Transportation.

Dunlay, WJ, Jr (Department of Transportation)

American Society of Mechanical Engineers DOT-OS-30093, 1976, 5 pp

ACKNOWLEDGMENT: International Aerospace Abstracts

ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A77-29466

01 155875

## DFW AIRTRANS TRANSIT SYSTEM SIMULATION

Description of a mathematical model of an intra-airport rapid transit system designed to transport passengers and baggage at the new Dallas-Fort Worth International Airport. The proposed simulation model moves trains and passengers over a guideway by processing time as an independent variable. All events such as train and passenger movement are associated with a specific simulation time and are processed at that time. At a particular simulation time, a type of event to occur in the future and the time of occurrence are determined. When the simulation time is incremented to the event occurrence time the event is processed.

Presented at the Control of Flight Conference, Anaheim, California, August 5-9, 1974.

American Institute of Aeronautics and Astronautics Proceeding AIAA 74-878, 1974, 5 pp

ACKNOWLEDGMENT: International Aerospace Abstracts

01 155880

## AIRTRANS OPERATIONAL READINESS TEST--AIRPORT INTERNATIONAL TRANSPORTATION EVALUATION

Airtrans provides International Transportation at the Dallas-Fort Worth Regional Airport. Operational readiness of the vehicles is assured by an automated departure test. The test plan was formulated in the conceptual stages of airtrans design. Main objectives of the plan were to make the vehicles testable using existing operational hardware and with no special test connector. Test design features had the same priority as other vehicle operating requirements. Merging test constraints with prime system operating requirements achieved an efficient and very thorough test. In addition, vehicle checkout features aided verification, production and maintenance testing. The results demonstrate that sufficient priority applied to test objectives, early, provides important contributions to overall system design.

From Automatic Support Systems for Advanced Maintainability, International Symposium, Arlington, Texas, November 5-7, 1973.

Nicholson, RA (LTV Aerospace Corporation)

Institute of Electrical and Electronics Engineers Proceeding 1973, 8 pp

ACKNOWLEDGMENT: International Aerospace Abstracts

01 155903

## THE AIRPORT ACCESS BY AIR AND LAND

The airport problems which have to be solved are examined, giving attention to questions of airport establishment, airport operation, approaches for reducing the disturbances arising from the airports activity, access facilities, and aspects of commercial forecasting. Details concerning the air traffic control problem and the congestion of airspace are considered, along with questions related to the airport in its urban and regional context. Other lectures are connected with problems of airport location and the question whether there should be one airport or more than one for a major city.

Proceeding of the 5th International Symposium, Paris, Nov 29 to Dec 1, 1972.

Institute Transport Aerien Proceeding 1974, 190 pp

ACKNOWLEDGMENT: International Aerospace Abstract

01 155911

## ACCESS TO AIRPORTS--SURFACE LINKS TO URBAN CENTERS

Surface access to airports is discussed in the context of a methodology for assessing the demand for a link and selecting a suitable system. A five-stage evaluation procedure is proposed airport classification, demand estimation, interchange studies, selection of modes and socio-economic analysis. Emphasis is placed on the necessity of considering the link in relation to the urban and airport distribution networks and the operational characteristics of the airport. The evaluation of the surface access requirements of the third London airport at Maplin are discussed in the framework of the methodology.

From Airports for the 80's. Proceedings of the 4th World Airports conference, London, England, 3-5 April 1973.

Mullett, LB Corcoran, PJ (Department of the Environment, England)

Institution of Civil Engineers Proceeding 1973, pp 93-98

ACKNOWLEDGMENT: International Aerospace Abstracts

01 155923

## DRIVER RESPONSE TO AN AIRPORT RADIO INFORMATION SYSTEM

Survey of how the restricted range radio systems can inform drivers, via their car radios, of traffic conditions and parking opportunities in specific areas is presented. Assessed is the response to such information by motorists at Los Angeles International Airport.

Lampert, S Carroll, FT (University of Southern California) Traffic Engineering Vol. 46 No. 10, No Date, pp 17-21, 3 Fig., 3 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

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01 158240

## ENGINEERING AND POLICE COOPERATION IN DESIGN AND OPERATION OF THE NEWARK AIRPORT INTERCHANGE TRAFFIC SURVEILLANCE AND CONTROL SYSTEM

The New Jersey Department of Transportation is developing a traffic surveillance and control system which will afford the Newark Airport Interchange area a high level of traffic management. The system will be composed of several related subsystems which will interact to detect, verify and respond to highway incidents. These subsystems are: traffic incident detection, closed circuit television, motorist aid call boxes, emergency vehicle monitoring, emergency vehicle routing, motorist alternate routing, and electronic master controller. The surveillance and control system is designed as a man-machine complex with careful consideration of the interaction of police responsibilities, which require the direct application of human judgment and police experience to the situations encountered, and computer capabilities for surveillance, verification and response during these emergencies.

Proceeding of the IFAC/IFIP (Intl Found for Inf Process)/IFORS (Int Fed of Oper Res Soc) Int Symp: Control in Transp Syst, Columbus, Ohio, 9-13 August 1976 Also available from ISA (Instrument Society of America).

Pontier, WE (Edwards and Kelcey, Incorporated)

International Federation of Automatic Control 1976, pp 21-28

ACKNOWLEDGMENT: EI

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01 200156

**AIRPORT ACCESS IN CANADA**

Although commercial aviation in Canada is primarily of international and national significance, many of its effects are of direct local concern. The problem of ground transportation to and from airports is one of these local concerns. This study evaluates the importance of ground access to Canadian airports, provides a basis for future decisions and defines priorities within the overall framework of urban and national transportation resource allocation and improvements. The study has two main foci. First, it examines if and to what degree airport access in Canada is understood as a problem by the various levels of government. The analysis is based upon three surveys conducted for this study. Second, a conceptual model is outlined to describe and quantify the elements of the air transportation system, most particularly the access portion. These parameters and the ranges of their values are discussed in the light of the existing literature and empirical studies on the subject. Also treated is the role of public transit as a ground access mode.

Pendakur, VS  
Ministry of Transport, Canada Res Rpt Aug. 1972, 85 pp, 22 Fig., 33 Tab., 155 Ref.

ACKNOWLEDGMENT: Roads and Transportation Association of Canada  
ORDER FROM: Ministry of Transport, Canada, Tower C, Place de Ville, Ottawa, Ontario K1A 0N5, Canada

01 201742

**AIRPORTS AGAIN: ACCESS OR AVOIDANCE?**

A major problem today is the increasing inability of the present air transportation system to accommodate the burgeoning demand for air travel. The conventional airport system itself is subject to diminishing returns on further investment, and aviation planners have begun to look seriously at alternative means of short-haul air transport. Primary among these alternatives is a vertical take-off and landing system since the costs of developing a VTOL system are equal to or less than those of its alternatives, the question would seem to depend on the benefits that those costs will permit. There is a growing feeling that a properly implemented intercity VTOL system will relieve nearly half the pressure on today's airports, removing short-haul passengers to more appropriate and convenient facilities and at the same time making available urgently needed VTOL airport and airway space for long-haul air transport. /HRIS/

Lawrence, DS *Traffic Quarterly* Vol. 24 No. 1, Jan. 1970, pp 5-20

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01 201790

**IS THERE A BETTER WAY TO GET TO THE AIRPORT?**

The increase in airline passenger traffic has created a crisis in the airport access problem. This article compares the efficiency of buses, railroads, and cars in solving this problem. Three different plans adopted in Cleveland, Chicago, and New York are described.

Thaler, D *Railway Age* Vol. 168 No. 4, Mar. 1970, pp 22-25, 5 Phot.

ORDER FROM: ESL

01 202048

**AIRPORT PROBLEMS: ACCESS AND AIR TRAFFIC CONGESTION**

Partially annotated listings of journal articles, reports and papers on the subjects of airport and air traffic delays are included. It updates bibliographic lists published by the former faa headquarters library: access to airports, August 1966; access to airports, supplement, November 1967; air traffic and airport congestion, March 1969.

Department of Transportation No Date

ORDER FROM: ESL

01 202301

**MARKETING ACCESS SERVICES: BALTIMORE-WASHINGTON REPORT NO 1: IMMEDIATE AIRPORT ACCESS STUDY ACTION IMPROVEMENTS**

Short term airport access improvements in the baltimore-washington area are studied with the design and implementation of a suitable access services brochure. Current access services at the region's airports and at nonregion

airports, functional requirements for information dissemination; brochure contents; distribution possibilities; and financial and management aspects of brochure development, maintenance, and dissemination are considered. Railroad and VTOL systems are seen to be cost-ineffective except for very special cases.

de Neufville, R Mierzejewski, E  
Metropolitan Washington Council of Governments 1970, 25 pp, 7 Fig, 2 Tab, 43 Ref

ACKNOWLEDGMENT: International Aerospace Abstracts  
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01 202532

**GROUND TRAVEL CHARACTERISTICS AT A REGIONAL AIRPORT**

This article describes some of the ground travel characteristics at a u.k. Regional airport which were established as part of a research study carried out at the university of newcastle upon tyne. Comprehensive surveys covering all airport trips were conducted for a complete week in February 1970. The subsequent analysis investigated person and car trip volumes, trip purpose, trip length, travel mode and trip end distribution. Catchment areas were defined by purpose, and person trip rates per air passenger were established. /author/

Harbidge, JF *Traffic Engineering and Control* Vol. 14 No. 9, Jan. 1973, pp 442-45, 2 Fig., 8 Tab., 8 Ref.

ACKNOWLEDGMENT: TRRL  
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01 223420

**AUTOMATED TRANSIT SYSTEM REDUCES WALKING IN EXPANDING AIRPORT**

Airport terminal buildings and their parking areas increase in size as air traffic increases, usually resulting in ever-longer walking distances for airport users. At seattle-tacoma international airport, however, A combination of good design of the current expansion and an automated transit system will reverse the trend toward increasing walking distances. The terminal concept employs two new satellite buildings. In addition, existing concourses are being extensively rebuilt, and a multistory parking facility is under construction. The concept depends on a method of moving people to and from the satellite buildings and to and from the ends of concourses 900 feet from the main terminal. That method is the automated satellite transit system which consists of automated vehicles running through tunnels, singly or in trains according to traffic demand. /author/

Mason, R *Westinghouse Engineer* Vol. 31 No. 1, Jan. 1971, pp 8-14

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01 225169

**ECONOMICS OF PARKING STRUCTURES AT AIRPORTS**

Multi level structures for parking automobiles are required to maintain acceptable walking distances to passenger terminals. The trend to parking structures for other enterprises is creating a public demand for this service. Six airports-Miami, Toronto, San Francisco, Dallas, Los Angeles and Houston-have parking structures in use or under construction. The daily cost of \$0.40 to \$0.60 for each parking space can be recovered from direct charges. The primary objective is to increase air travel by giving better service to passengers. Structures should be designed with clear spans of approximately 55 ft for parking by customer. /author/

Stafford, PH *ASCE Journal of Aerospace Transport Proc Paper* Vol. 92 No. ATL, No. 4627, Jan. 1966, pp 131-143

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01 226285

**ANALYZING THE OPERATIONAL FEASIBILITY OF AUTOMATED PARKING SYSTEMS**

The logic, rules of operation, and constraints for an automated car assignment and parking system for airports are described. A computer simulation of the system, when provided with information on demand and physical configuration of the parking structure, produces hourly and weekly

car movement summaries. Based on an evaluation of service, equipment utilization, capacity, and costs, the system of machine parking simulated here was not installed at the site under consideration.

Browne, JJ *Traffic Engineering* Vol. 41 No. 1, Oct. 1970, 5 pp, 2 Tab., 1 Phot., 4 Ref.

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01 226654

**IMPROVING THE EFFICIENCY OF AIRPORTS**

The steps being taken to develop more efficient airports in order to shorten total trip time are outlined. Airports must be enlarged, boarding gates must be spread out, and the parking space must be expanded. These changes involve longer travel distances within the terminal area. Basic transport systems considered are the continuous type (private cars or taxis), and the batching type (buses and guided systems). Baggage handling, fire protection, security, monitoring of dispersed equipment, and central control are discussed. /iaa/

Byers, RH Shields, CB Thompson, RE *Research Outlook* Vol. 3 No. 2, 1971, pp 7-12

ACKNOWLEDGMENT: International Aerospace Abstracts

01 226761

**AIRPORT-BOUND MOTORISTS "TALKED IN" BY RADIOS**

A unique system that traffic engineers of the not-too-distant future may well be using to aid in the control of traffic on expressways, freeways and wherever there is undue traffic congestion is being tested on the west coast where motorists using Los Angeles international airport are being "talked" into and around the airport by radio. The limited range radio system, which radiates A signal that can be picked up on any automobile radio, transmits up-to-the-minute reports on traffic and parking lot conditions, directions on how to reach any one of the several airline terminals and parking lots, and a variety of other information designed to reduce traffic congestion in the area by aiding the airport-bound motorist in reaching his destination with minimum delay and confusion. This article includes a description of the system's equipment and operation.

Rach, K *Better Roads* Vol. 43 No. 7, July 1973, pp 34-35, 1 Fig., 2 Phot.

01 226911

**AUTOMATED PARKING SYSTEM REDUCES AIRPORT CONFUSION AND CONGESTION.**

This article discusses the functions of the computer controlled parking system at the Dallas-ft. Worth airport, 17 miles equidistant from the to cities. It reviews the physical constraints that dictated the control philosophy and includes flow diagrams, pictures and maps. It is limited to the approach and does not include information on final acceptance testing and system implementation.

Kolecp *Traffic Engineering* Vol. 44 Mar. 1974, pp 14-20, 8 Fig.

01 227950

**A NEW APPROACH FOR AIRPORT ACCESS SURVEYS**

satisfactory solutions to congestion within and at the access routes of an airport may require data beyond the response to standard origin-destination questions and for all subgroups of airport users. An airport is considered as a closed system, generating vehicle & person trips, sampled within randomly or systematically selected observation time periods. Sampling at airport egress points may be most effective, but least feasible administratively. An alternative is presented which consists of developing a model for estimating the hourly volume of vehicle and person trips from machine counts at egress points and surveying four strata of airport users for collecting additional data with estimation based on post-stratification. /author/

Theodore, CA Hodder, JC *Transportation Science* Vol. 3 No. 4, No Date, pp 335-43

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01 228030

**CLEVELAND HOPKINS AIRPORT ACCESS STUDY-SURVEY RESULTS**

the impact of the rapid rail transit extension to hopkins airport was analyzed. A survey of airport users at hopkins airport was conducted before the

opening of the Cleveland transit system rail transit service to the airport (phase I) and another survey was conducted one year later (phase II), after the rail rapid service was opened. The data from these surveys were compared to determine the effect of the new rail transit service on the choice of travel mode by the different groups of airport users. The typical air passenger taking the rapid transit is male (80.1, of the passengers who ride the rapid transit), has an annual family income over \$15,000 (61.2%), is on business or traveling to or from a convention (58.6%), checks only one bag or none (82.4%), and is traveling by himself (72.3%). Sixty-two percent of all air passengers riding the rapid transit check at least one bag on their flight. /author/

Regional Planning Commission, Cuyahoga County, Department of Transportation June 1970, 180 pp

01 228292

**CLEVELAND-HOPKINS AIRPORT ACCESS STUDY: DATA FILE EDITING & PRELIMINARY ANALYSIS; DATA FILE FORMATS AND CODE DESCRIPTIONS; SELECTED TABULATIONS, AIR PASSENGER STUDY**

The purpose was to assess a new rail rapid transit extension between the Cleveland central business district and hopkins airport with reference to its impact on modal split and ridership. Statistical data on airport access by air passengers, passenger-related visitors, casual visitors, and airport employees were collected in two surveys taken before and after the commencement of transit operations. The "data file editing" report mathematically expands the survey sample data into reliable estimates about the entire population of airport users. Coding process, data editing procedures, survey response rate, and subsequent expansions of the sample are detailed. Some preliminary analysis of the data is provided through comparisons of air passenger survey results with rapid transit interviews. The "data file formats" report documents actual programming procedures used to analyze the data. Appended material includes airport maps showing the survey locations and sample questionnaires. The "selected tabulations" report reproduces actual computer printouts of significant survey data. The tabulations break down two general areas of major interest to the project sponsors: (1) mode of travel by local origin or destination and selected characteristics of the air passenger and his trip; and (2) transit station by residence of air passenger and direction of travel for selected characteristics of the air passenger and his trip. Appended material includes traffic centers and census tracts in the survey area, rapid transit stations, and sample questionnaires. /UMTA/

Regional Planning Commission, Cuyahoga County No. TRD-36, May 1970

ACKNOWLEDGMENT: UMTA

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PB-195047, PB-195048

01 228529

**THE VALUE OF TIME FOR AIR TRAVELLERS ON THE LAND FEEDER JOURNEY TO AN AIRPORT**

This paper firstly considers the theoretical and empirical work that has been done on the value of travel time, as A backfround to a discussion of the values of time used by the research team of the commission on the third London airport. The results of a survey carried out at gatwick airport in September 1971 are described. From these results, new value of journey time for air travellers on the land feeder journey to an airport are derived, which the author considers to be appropriate.

Saunders, L

Reading University, England R & D Rpt No. 13, Jan. 1972, 67 pp, 23 Tab., Refs.

ACKNOWLEDGMENT: TRRL

01 239535

**AIRPORT ACCESS IN THE BALTIMORE-WASHINGTON REGION: IMMEDIATE-ACTION IMPROVEMENT PROGRAM AND PLANNING GUIDE**

The research was conducted in two phases. The first phase consisted of data collection, network coding, and data processing pertaining to socio-economic and demographic tendencies, transportation facility service characteristics, and airport travel patterns. A survey of existing transportation facilities was made to determine the level of transportation service in the



study area provided by the different modes of transportation, as evaluated from associated costs. Population and employment data were developed for 1965, forecast for 1970, and transmitted for use in the access demand forecasting work. The following major deficiencies were found in current regional airport access public transportation services: poor accessibility to low-density residential areas, lack of travel time reliability during the morning and evening rush hours, and marginal economic feasibility of current operations. The objective of the second phase of the study was to develop an improvement program for airport access in the Baltimore-Washington region. General problem areas were defined and policy decisions made regarding the focus of detailed studies. It is recommended that increased service to low-density areas be provided by either extending reservation routes to transfer points where free parking and taxi services are available or by operation of group-riding service. Significant improvement is needed in the traffic circulation system at national airport and is contingent upon the implementation of a one-way circulation plan. The recommended plan permits further improvement on national airport on either a near-term of a major-reconstruction basis. Conversion of the partial one-way flow pattern at friendship airport into a complete one-way pattern will facilitate travel and eliminate a major safety hazard. /UMTA/

Peat, Marwick, Mitchell and Company, Metropolitan Washington Council of Governments No. TRD-63, Mar. 1971

ACKNOWLEDGMENT: UMTA  
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PB 198820

#### 01 239614 AIRPORT ACCESS AND CIRCULATION SYSTEMS FOR AIRPORTS: PROBLEMS AND SOLUTIONS

Environmental constraints placed upon airport development through the Environmental Policy Act of 1969 and the airport and airways development act of 1970 have made airport operators and planners realize that new airport development or expansion of existing airports is and will continue to be extremely difficult. In the past, the problem of travel between a passenger's home and the airport has not generally been a concern of the airport operator or planner. However, as the choking curb-side automobile traffic begins to limit expensive gate, apron, and runway capacity, ground access has become the airport planner's problem. Although automobiles, limousines, hotel and motel pickup cars, and other vehicles cause internal airport congestion, airport operators have been reluctant to support systems that reduce private automobile traffic because these contribute substantial parking revenues. The future will see little deviation from the highway as the primary form of ground access to airports; those variances that may occur will only be in the most congested metropolitan areas. Innovative airport access development, therefore, will be concentrated on providing unique and ingenious intra-airport systems to interface with ground access systems to avoid choking curb-side traffic which limits the effective and efficient operation of the entire airport. /author/

Corradino, JC *Institute of Traffic Engineers, Proceedings* Sept. 1972, pp 22-33, 9 Fig.

#### 01 241332 HORIZONTAL ELEVATORS SERVE AIRPORT PATRONS LIKE TAXICABS

The monocab automated transit system has been designed to move a multiplicity of small vehicles according to individual passenger demand. Six-passenger electrically powered cars are suspended from a guideway that can circle and criss-cross areas of maximum activity, such as airports, university campuses, shopping centers, and downtown business blocks. The monocab vehicles are powered through electric distribution lines built into the overhead guideway. Each cab is an independent unit, with propulsion by two 20-hp DC motors.

Reid, M *Product Engineering* Vol. 41 No. 5, Mar. 1970, pp 65-66

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#### 01 241383 AIRPORT ACCESSIBILITY & URBAN TRAVEL; LINKAGE BETWEEN AIR TRAVEL AND URBAN TRANSPORTATION PROBLEMS

At airports serving large cities, daily population frequently exceeds 100,000 generating at least 150,000 trips throughout the urban area. Such trips add

a heavy load to the over-all transportation system and compound traffic congestion problems confronting urban communities. In considering a needed improvement in airport accessibility, it is essential to recognize that surface travel activities generated by the airport must be absorbed by the existing urban transportation network. If the network is deficient, improvement of any particular airport access will not materially solve the problem of getting to the airport. The workability of any solution to the problem, therefore, must be evaluated on the basis of whether the improved or added access facility can serve as a functioning element of the over-all urban transportation system. Improvements now being implemented, planned or experimented with include bus rapid transit services, exclusive airport access expressway, rail rapid transit services, new concepts in airport design, rail-bus services and V/STOL or helicopter air taxi and shuttle services. /author/

American Automobile Association May 1970, 36 pp

#### 01 241433 PASSENGER TERMINAL IMPEDANCES

conventional transportation network analysis requires the estimation of the times necessary to complete three portions of a typical intercity trip. Although the times associated with the line-haul and access portions have been studied extensively, the time required for transfer between access and line-haul modes has not been handled adequately. These times, or impedances, occur at any intercity passenger terminal for air, rail, and bus modes. This paper identifies each of the major components of the passenger terminal system and develops the respective impedance methodology for each as well as a technique for combining them into a single value representative of the total impedance level for a particular terminal. Data were collected at several intercity terminals in the Washington, D.C., area; and the impedance levels were determined for each terminal. The methodology and many of the component values are directly transferable to other terminals. In addition, the methodology may be used as an aid in evaluating alternative functional arrangements of the various terminal facilities. /author/

Bruggeman, JM Worrall, RD *Highway Research Record, Hwy Res Board* No. 322, 1970, pp 13-29, 8 Fig., 7 Tab., 6 Ref.

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#### 01 241455 MASS TRANSIT TO AIRPORTS-AN OVERVIEW

The current airport problems are a combination of interrelated problems of which getting people and freight to and from the airport is only one facet. Ground access times to airport facilities have not decreased at the same rate at which jet aircraft have reduced flight times. This has resulted in a growing disparity between the time necessary to make the air flight and the total time necessary for the trip. In addition, current highway capacity to airports will not be sufficient to meet forecast growth in airport usage. While improved ticketing and baggage handling and improved air traffic control procedures may improve the terminal delay and congestion problems, it is difficult to attack the the airport access problem. Capital investments and costs resulting from improved passenger processing procedures are minimal in comparison to required expenditures to improve the ground access to the airport. In addition, the cost of airport improvements can be recouped through direct charges to the air traveler, the airlines, and other users of the airports. By comparison, the required highway investments necessary to adequately handle forecast peak-hour traffic volumes are extremely high and may result in substantial disruption and relocation in urban areas. Although airports are large generators of highway traffic, they do not bear a high enough continuous volume of traffic to amortize the tremendous cost of investment or to overcome the growing public resistance to further development of high capacity road systems in urban areas. It is becoming evident that in many cases it will be financially and socially impossible to develop enough freeways to cope with the airport access problem or sufficient parking sites at the airport to meet the forecast demand for private automobile parking. Because of the investment costs and length of time required to develop fully operational systems, the so-called new technology systems are not feasible as a short-term solution. Four alternatives that appear to be feasible for existing airports or those currently under construction are (a) railroads and subhighways using separate rights-of-way; (b) railroads and subways using common rights-of-way with other rail traffic; (c) buses and limousines using separate highway rights-of-way; and (d) buses and limousines using existing highways and city street systems. The advantages and disadvantages of these alternatives are examined. /author/

Cook, KE *Highway Research Record, Hwy Res Board* No. 330, 1970, pp 1-4, 1 Ref.

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01 241456

## THE AIRPORT ACCESS PROBLEM IN TOKYO

At the time of the 1964 olympic games, an expressway and A monorail access were constructed between Tokyo and its international airport. Soon the former was severely congested and the latter underutilized. The new Tokyo airport, built to accommodate sst's, is so far from downtown that highway travel is at present infeasible. As an interim solution, a terminal facility offering high-quality and high-speed passenger service is being constructed to act as a mode exchange between urban expressways and rail/bus transportation to the airport.

Akiyama, T *Highway Research Record, Hwy Res Board* No. 330, 1970, pp 5-12, 5 Fig., 2 Tab.

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01 241457

## AIRPORT ACCESS TO HEATHROW AIRPORT, LONDON

At present heathrow is the major airport serving London, and it is anticipated that by 1970 its traffic will be 30,000,000 annually, more than double its present volume. Unlike gatwick, whose rail link handles 40% of its passengers, heathrow is served only by (overloaded) freeways and public roads. A 1966 o&d study showed that about half of the passengers (chiefly international) used public transport (chiefly buses) to reach heathrow. It was subsequently decided to extend a rail service from center city to the airport. Aspects of the decision are described. Two questions remaining from the analysis are: (1) should public transport serving a large airport be viewed as a system designed around the needs of the air passenger, or should it be part of the public transportation system that air passengers can use if they so desire? (2) will air passengers of the future expect, in addition to town terminal facilities and associated check-in and baggage-handling services, an exclusive transport system to the airport that these require, or will they be prepared to use the common system that the public uses to reach the airport?

Hole, G *Highway Research Record, Hwy Res Board* No. 330, pp 13-15

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01 241458

## PROVIDING GROUND ACCESS TO THE KANSAS CITY AIRPORT

Kansas city international airport is scheduled to open in 1971, at which time all commercial operations will be transferred from the present Kansas city municipal airport. This will be one of the principal regional airports of the United States. It is now anticipated that more than 5 million air travelers will arrive, depart, and transfer at this airport during its first year of operation, and a rapid growth from this number is expected each year thereafter. The present airport, Kansas city municipal, is 2 miles north of the Kansas city CBD. Studies made in connection with planning on this project showed us that approximately 30 percent of the air passengers at Kansas city were transients to the CBD and another 40 percent are residents living in the south and southwest parts of the metropolitan area. The new airport, Kansas city international, is located to the north and west of the CBD, 19 miles from the CBD. Three years ago, the Kansas city area transportation authority, shortly after its organization, realized that planning should be commenced on a public transportation system to serve this airport. Travel habits and travel patterns would be altered drastically by the airport relocation. It was thought that, because of the expected and rapid development in the airport area, the existing and committed highway and freeway systems would be overtaken within a few years after the airport opens. With the aid of a technical study grant from the urban mass transportation administration, the transportation authority contracted with the engineering firm howard, needles, tammen and bergendoff to examine the problem and to make recommendations of the authority. Specifically, the engineers were commissioned to (a) project to 1990 the traffic on the freeway system serving the airport and estimate the demand for and use of a public transportation system; and (b) examine the various systems that are or shortly will be available and recommend a system to the authority. Hntb's recommendation of a rapid transit access system is described and discussed. /author/

Icenogle, W *Highway Research Record, Hwy Res Board* No. 330, 1970, pp 16-20, 4 Phot.

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01 241459

## CLEVELAND RAIL TRANSIT AIRPORT SERVICE

The study reported is organized around the extension of the Cleveland transit system (cts) rail rapid transit line to hopkins international airport. An objective in this study has been to develop the means to make accurate forecasts of transit demand as a supplementary mode for airport access, based on the empirical data and experience in Cleveland. The rapid rail link to the Cleveland airport represented A unique opportunity for such a project; it is only direct connection of a rapid rail system to a major airport in the United States and was only made possible through a federal grant under the mass transportation act of 1964. To the extent that grant applications for similar extensions may be made in the near future and because of the department of transportation's responsibility for coordinating and promoting interstate transportation, this study will have A direct application in policy decisions of the department. It will also provide some valuable information that can be used on the state and local levels for regional transportation planning. /author/

Wiggers, GF *Highway Research Record, Hwy Res Board* No. 330, 1970, pp 21-24

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01 241460

## AIRPORT ACCESS PLANS FOR BOSTON

Logan international airport in east Boston is located closer to the central business district than any other major airport in the United States. Although it is only 2 airline miles from the airport administration building to boston's city hall, the airport is nevertheless somewhat isolated geographically from the people it serves, both air travelers and those who work there. This isolation comes about because logan is on a peninsula surrounded on three sides by arms of Boston harbor. Direct land access is from the northwest only. Highway access between logan airport and downtown Boston is via the mystic river bridge or via the sumner and callahan tunnels (really one tunnel in which sumner tunnel carries westbound traffic and callahan tunnel carries eastbound traffic). These routes are severely congested during rush hours. To get to and from the airport, the people who live in the communities to the west, southwest, and along the south shore must face these bottlenecks, not to mention the downtown fitzgerald expressway. The people on the north shore are more fortunate. They have the mcclellan highway (route C-1). People who live to the northwest of the city as in everett and chelsea face a system of secondary roads and back streets. Until Cleveland opened its new airport transit line, Boston was the only u.s. City that could boast a direct rail transit line to its airport, but the situation is not as good as it sounds. First of all, the mbta blue line, or east Boston line, only passes by the airport and does not go directly to the terminal area. It is necessary to take a shuttle bus from airport station for about a mile or so to the various terminals. Second, the blue line, when it gets downtown, terminates near government center and is not a through route. People destined for back bay or brookline (the western and southern suburbs) must transfer to other rail lines serving these areas. People destined for Cambridge, dorchester, or the south shore must make two rapid transit station transfers. Possible improvements to the existing situation are discussed. /author/

Muehlberger, R *Highway Research Record, Hwy Res Board* No. 330, 1970, pp 25-29, 1 Tab., 3 Ref.

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01 241534

## A SURVEY OF NEW YORK CITY AIRPORT LIMOUSINE SERVICE: A DEMAND ANALYSIS

An intensive, in-depth survey of a New York city airport limousine service was conducted to determine the nature of the demand for airport-access services. The principal findings are that (1) the use of the service is strongly asymmetric by direction; (2) the socioeconomic characteristics of the users are similar to those of other airport travelers; (3) A significant number of riders are essentially captive to the service; and (4) travelers arrive at the airport well ahead of flight time, 50 percent of them being there about an hour early. The modal-split model statistically calibrated from these and



other observations indicates that airport-access travelers are relatively insensitive to speed but are quite sensitive to costs. /author/

de Neufville, R. Koller, F. Skinner, R. *HIGHWAY RESEARCH RECORD. HWY RES BOARD* No. 348, 1971, pp 192-201, 7 Fig., 4 Tab., 20 Ref.

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01 241559

#### HORIZONTAL PEOPLE MOVERS

Six new transit systems that can help revitalize the center city are discussed. Included are carveyor and dashveyor. Scat (small car automatic transit) is a scheme for individualized public transit facilities. Satellite transit system and airside/landside are two airport transit systems. The Minneapolis skyway provides a mode mix between pedestrians and automobiles. /author/

Lebowitz, S. *Design and Environment* Vol. 1 No. 2, 1970, pp 54-59

01 241699

#### AIRPORT PEOPLE MOVER: "MOST SOPHISTICATED" SYSTEM BEING TESTED IN SEATTLE

Westinghouse electric corp. Has begun testing the vehicles and automatic train controls for the new passenger transit system being installed at the seattle-tacoma international airport. Nine 106-passenger vehicles will carry air travelers to and from their boarding gates. The lightweight electric vehicles have rubber tires and are propelled by 100-horsepower motors, providing smooth, quiet, fume-free operation. The entire system is scheduled to go into operation later this year. Automatic operation will be supervised by a central control computer, which will control station dwell times and make sure the trains are properly spaced on the system at all times for passenger convenience. Tests also are being conducted on transfer tables that will be used to move the vehicles off or on the guideways for maintenance or operation. Startup tests are also underway on the station doors and communications and power systems.

*Passenger Transport* Vol. 35 No. 19, May 1972, p 8

01 241925

#### GRAVITY-VACUUM TRANSIT SYSTEM, BASELINE DEFINITION OF AIRPORT ACCESS AND CORRIDOR SYSTEMS

Gravity-vacuum transit (gvt) systems designed airport access and corridor (defined as intercity) applications, employ the combined forces of gravity and atmospheric air pressure for propulsion of trains through evacuated underground tubes. Five basic features of the gvt system are identified for modification in airport access and corridor service. Design speed of the vehicle (which is less than 200 mph in urban applications) would increase to 300 mph for airport access and 400 mph for the corridor system. Maximum tunnel depth between stations would vary between 2,000 and 3,500 feet respectively with tunnel slopes no greater than 12%. The long-stage gvt design would necessitate the construction of crossports between two parallel tunnels to permit the circulation of "thin air" in front of a train back into its tube behind it. Special gate valves would have to be developed to prevent crossported air from decelerating trains moving in the parallel tubes. Some additional modifications in the basic vehicle design would also be necessary. The report analyzes all aspects of the gvt system with reference to its applications in airport access and long-stage corridor service. These include propulsion; tunnels, tubes and stations; train configuration; operational features; and performance estimates based on computer simulation of a gvt prototype. Two proposed applications are discussed in detail--access at dulles airport and service in the Northeast Corridor. Detailed performance projections are appended. The report also recommends further research and development projects with regard to design of the crossports and wheel-rail suspension dynamics. /UMTA/

Tube Transit Corporation No. TRD-43, May 1970

ACKNOWLEDGMENT: UMTA

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01 241963

#### DULLES INTERNATIONAL AIRPORT ACCESS

This report is a detailed study of highway access to the dulles international airport, emphasizing the relationship between daily vehicular volumes on

existing access roads and the number of daily departing passengers. The basic objective is to provide long-range planning data and to recommend methods for handling traffic volumes in the access corridor. The material is presented in four basic areas: (1) traffic distribution at the airport; (2) parking lot utilization; (3) time and modal distribution (broken down among bus, limousine, and taxi passenger distribution); and (4) occupancy per vehicle (broken down between public and private transportation). Two basic conclusions were yielded: (1) public transportation to the airport is under-utilized and existing service is inefficient. (2) during peak travel periods, as much as 15% of the access road volume represents commuter traffic. This additional demand adds an insignificant volume to the under-utilized access road, however projected increases in airport operation, employment, and adjacent land development will severely tax the road's capacity in the future. Several recommendations are also advanced. A separation of purely commercial and airport employee traffic from the volume generated by air travelers and commuters is suggested. The report does not attempt to separate airport traffic and commuter traffic on the access road. The importance of distinguishing between commercial and public traffic is based on the projection of cargo handling and industrial growth in the dulles airport vicinity and consequent demands on the highway facility for goods movement. For the increasing volume of international flights terminating at dulles, a separation of these operations from domestic operations is recommended with each served by distinct physical and access facilities. Construction of "satellite" parking areas connected by rapid transit to the dulles terminals is suggested for long-term users. The report discusses the feasibility of handling passenger service through suburban terminals that could connect enplaning travelers with the airport by means of existing or expanded public transportation. The report gives particular attention to projected metro routes to dulles and to pilot projects with passenger services operated at suburban terminals. /UMTA/

Baxter, RG

Consortium of Universities No. URT-11, 1970

ACKNOWLEDGMENT: UMTA

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PB-194094

01 242100

#### TRANSIT ACCESS TO OAKLAND INTERNATIONAL AIRPORT

This is a comprehensive technical study of transit feasibility in the corridor between a proposed bay area rapid transit (BART) station and the Oakland international airport. A review of potential transit service concepts revealed two alternatives for the corridor and four vehicle concepts. A detailed transit impact analysis was conducted to determine four routing options. One route would serve existing commercial and industrial development centers while another would serve the areas where future development is anticipated. A third route would serve the airport exclusively by providing nonstop service. The fourth route, with two branches, could serve all existing and future activity centers. Various combinations of service concepts, vehicle designs, and routes were evaluated to yield an optimal configuration for the corridor. A connector alternative was found to provide more frequent and lower cost service than a BART extension. The use of modified BART vehicles in the connector system was deemed necessary to make the system compatible with the BART mainline. The feasibility study also determined that a routing network designed to serve future industrial and airport developments would be optimal. The total connector route will span approximately 3.8 miles. An in-depth feasibility analysis concluded that operation of the connector system could prove economically beneficial both in terms of farebox revenues and the relief of regional traffic congestion. Appended material includes urban design criteria, results of a regional transit survey, a historical review of present airport transit links, methodology for patronage forecasting, criteria for development of the connector system, and interim program ridership data. /UMTA/

Kaiser Engineers No. CAL-T9-9, Oct. 1970

ACKNOWLEDGMENT: UMTA

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PB-197837



01 242101

## HIGH SPEED GROUND TRANSPORTATION AIRPORT ACCESS ROUTE STUDY, LOS ANGELES INTERNATIONAL AIRPORT TO SAN FERNANDO VALLEY

This is a comprehensive route analysis of the proposed high speed ground transportation system to connect Los Angeles international airport and the San Fernando valley. The system will employ tracked air cushion vehicles (tacv) powered by linear induction motors in a demonstration of the concept for high speed urban transportation. The proposed tacv will operate over a grade-separated, double u-shaped guideway with span lengths of 100 feet. The structural system is described in detail; concrete will be the primary construction material. Three proposed stations along the initial 16.4 mile route are also described. Several alternating-current and direct current electrification options were reviewed to determine the optimal system for tacv propulsion. A 1,500 volt DC system was selected primarily for its economic advantages; substation and power distribution requirements are outlined in the report. Vehicle performance is also discussed briefly with reference to running time and average velocities. Speeds of between 100 and 150 mph. Should be achieved for A distance of approximately 46,000 feet. A route analysis which indicates gradients and location for each segment of the proposed system are contained, and preliminary design criteria are developed. /UMTA/

Kaiser Engineers No. CAL-T9-10, Sept. 1970

ACKNOWLEDGMENT: UMTA  
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01 242110

## ECONOMIC AND TECHNOLOGICAL FEASIBILITY OF A RAPID TRANSIT TYPE OF SERVICE BETWEEN THE NEW ORLEANS UNION PASSENGER TERMINAL AND THE NEW ORLEANS INTERNATIONAL AIRPORT

The highway bus, a well known medium of transportation, is in current operation. The rail bus, a combined rail and highway vehicle, offers an interim mode whereby the delaying effects of highway congestion between the terminal stations may be alleviated pending the provision of a more sophisticated system of rail transportation. The budd rdc-2 is a standard railroad, combination passenger-baggage car, diesel propelled system; these cars are currently available at attractive prices and would provide a comfortable, safe, and speedy trip between the two terminals. Either the rail bus or the budd rdc-2 would operate over the n.o.u.p.t. And Illinois central railroad tracks to the point of turnout to the airport; the rail bus would accomplish the trip in an estimated running time of 24 minutes, the budd rdc-2 car in 20 minutes. The rail buses would cross the airline highway at grade with traffic light protection; they would load and discharge passengers, curbside, at the airport terminal building. A viaduct overpassing the airline highway with an elevated passenger station at the airport terminal building would be provided for the budd rdc-2 cars. Of the two systems, the budd rdc-2 car system seems to possess the greater merit and the authors, therefore, recommend its adoption. To attract other than airport patronage, the rehabilitation and reactivation of the currently disused kenneb station of the Illinois central railroad is also recommended. /UMTA/

Burk and Associates, Fromherz Engineers No. LA-T9-1, Oct. 1969

ACKNOWLEDGMENT: UMTA

01 242111

## ECONOMIC AND TECHNOLOGICAL FEASIBILITY OF A RAPID TRANSIT TYPE OF SERVICE BETWEEN THE NEW ORLEANS UNION PASSENGER TERMINAL AND THE NEW ORLEANS INTERNATIONAL AIRPORT, SUPPLEMENT

This supplement become necessary due to the fact that full information relating to railroad train movements, particularly in the east bridge junction area, had not been presented to the authors during the study period. The then available, however incomplete, data on train movements indicated that the interfacing of railroad and rapid transit train movements could be accomplished without the imposition of costly structural overpasses in the areas of greatest activity. The analysis of the additional data indicates that viable rapid transit operations with 20 or 15 minute headways can be provided by a two track overpass at east bridge junction and by the double tracking of certain single track sections. The modes of rapid transit operation discussed in the original report are representative of two modes by means

of which a system of rapid transit could be operated over existing railroad trackage, between a downtown area and an out-lying public airport. The two modes discussed were not presented as a final solution, or even as the most effective solution. Their purpose was to provide, within a short period of time, for a minimal expenditure, A means to alleviate the expanding delays to and from the airport caused by growing highway congestion. The authors strongly recommend that new, modern concepts of high-speed rapid transit available today be studied and given consideration for a demonstration grant. /UMTA/

Burk and Associates, Fromherz Engineers No. LA-T9-1, Feb. 1970

ACKNOWLEDGMENT: UMTA

01 242117

## INVENTORY OF SERVICE FACILITIES AND HIGHWAY ACCESS FOR MASSACHUSETTS AIRPORTS

The report is an inventory of existing airports serving Massachusetts with an appraisal of regional and local access highway road conditions and capacities. The inventory of airport facilities was limited to 34 sites which generate at least 50 aircraft operations daily. The objective of the report was to document basic data which will assist in the planning of future airport and highway access facilities throughout the commonwealth. For each of the 34 major airports covered, all relevant information is listed, including runways, tower capabilities, schedules, scope of operations, and number of based aircraft. In addition, the report contains a physical and functional appraisal of regional highway service (including the airport access routes) for each of the 34 centers. Such information as highway width, type of surface, structural condition, average daily traffic, and maximum 24-hour service volume is detailed. The report concludes with a comprehensive listing of all 77 airports in Massachusetts (including private landing facilities) and a state map. /UMTA/

Massachusetts Department of Public Works No. MASS-T9-7, May 1970

ACKNOWLEDGMENT: UMTA

01 242342

## HIGH SPEED GROUND ACCESS STUDY, LOS ANGELES INTERNATIONAL AIRPORT

The report sets forth a review of the projected ridership, construction costs, operating costs, and resultant financial analysis relative to the proposed high speed ground access system between Los Angeles international airport and San Fernando valley. The system is composed of a tracked air cushion vehicle (tacv) system and an intra-airport system system is either an intra-airport transit (iat) system or A bus system. The report studies the tree alternative high speed ground access systems; a 16 mile tacv/iat system, A 16 mile tacv/bus system, and an 8 mile tacv/bus system. /author/

Los Angeles Department of Airports Apr. 1972, 87 pp

Contract DOT-UT-312

ACKNOWLEDGMENT: NTIS  
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01 242449

## AIRPORT ACCESS

The significant findings regarding the San Francisco, California airport ground travel studies are presented. The methodology developed to test and evaluate the inter-relationships of ground transportation facilities with airport location, size, and service levels is described. The primary objective of the access portion of the study is to measure the ability of existing and planned ground and air transportation systems to serve passenger, cargo, mail, employee, vendor and rental car, airport access, and parking demands through 1985. /author/

Smith (Wilbur) and Associates June 1970, 150 pp, Refs.

ACKNOWLEDGMENT: Scientific & Technical Aerospace Repts

01 242534

## INTERNATIONAL METROPOLITAN RAILWAYS COMMITTEE-AIRPORT TO CITY COMMUNICATIONS

Airport access is at the present time unsatisfactory in many cities. Growth in the number of air passengers, the introduction of larger aircraft, and

increasing highway congestion indicate the need for better access. Another factor involved is the increasing distance between existing city centers and the new airports being built to accommodate the greater volume of passenger and freight air traffic, and the larger planes. The problem is made more acute by the increase in airport personnel and the handling of mail. Air transportation (helicopter, VTOL, STOL) is objectionable as an answer for various reasons, i.e., noise and air pollution, economic considerations, and air space requirements. Rail access appears to be the only available proven means of access with the requisite capacity. Rail service is safe, fast, reliable, and economical. The railroad car, whether metro, or other, can provide a high degree of comfort and ample space for luggage. And, in addition, many cities are served by rail lines which are either near the airport, or can be extended to the airport without major disruption of communities or extraordinarily high costs. At this time the railroad is undoubtedly the least objectionable transportation medium with regard to noise and air pollution, and is by far the most efficient measured by space and power required per passenger. There are, however, disadvantages to rail transportation. A major disadvantage is the question of who pays for the construction and operation of a rail line between the central city and the airport. This question is discussed very briefly, offering few answers. Emphasis is made that provision of rail facilities should not be delayed. The construction of a rail line concurrently with an airport is pointed out as being the ideal situation.

Ronan, WJ

International Union of Public Transport Tech Paper No. 3a, 1971, 24 pp, 7 Fig., 9 Tab.

01 242561

#### A STUDY OF THE EXISTING AVIATION SYSTEM AND ITS EXTENSIONS, PART E--THE GROUND ACCESS ELEMENT

At a few major hub airports today ground access is either the limiting factor on airport capacity or is rapidly becoming so. As airport/airways/aircraft productivity are increased, ground access will become even more critical. The report is intended to define the performance characteristics of present and near-term ground access systems as an input to aac's overall planning process. /ntis/

Battelle Columbus Laboratories Jan. 1972, 70 pp

ACKNOWLEDGMENT: NTIS

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Pb-215897/0

01 242579

#### REEVALUATION OF GROUND ACCESS TO AIRPORTS

This paper summarizes data obtained from states or other local sources on the central business district and airport highway connections in 1972. The main parameters considered are peak and off-peak travel time and travel speed. A comparison was made with similar data collected in 1968 and published in highway research record 274. In addition, two earlier data sets collected by other sources in 1949 and 1965 are displayed and compared with the 1968 and 1972 data sets.

Silence, SM Chesshir, LM *Highway Research Record, Hwy Res Board* No. 439, 1973, pp 19-27, 11 Fig., 4 Tab., 4 Ref.

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01 260186

#### AIRPORT AND HARBOR ACCESSIBILITY IN THE SAN FRANCISCO BAY AREA. A STUDY OF THEIR FUNCTION AND ROLE IN THE REGIONAL TRANSPORTATION PLAN. LEGISLATIVE SUMMARY

The document presents a summary report detailing the findings and recommendations of the Metropolitan Transportation Commission's study on the role of airports and Harbors as they relate to the regional transportation plan. (Report No. MTC-SPSP-74-01) Abstracts of the Airport Accessibility Report and the Harbor Accessibility Report with a listing of relevant findings and recommendations are included.

See also Volume 2, PB-230356.

Negrette, AJ

Metropolitan Transportation Commission Final Rpt. MTC-SPSP-074-01, Jan. 1974, 19 pp

ACKNOWLEDGMENT: NTIS (PB-230357/6)

20

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01 260792

#### AIRPORT AND AIR SERVICES ACCESS

The problems of airport and air service access are discussed. Airport access, primarily an urban transportation system problem, is investigated using data obtained from the Cleveland-Hopkins Airport Access Study and other surveys. The nature of airport access and of passenger behavior with regard to it is studied to determine what governmental policies might be appropriate. Airport access is a subset of air service access; attention to problems of the latter can improve service for the air passenger. The study investigates two aspects of the air service access problem: air network configuration and the use of satellite airports. Using aggregate delay time as a measure of effectiveness, the most efficient network appears to be one in which traffic is concentrated, reducing network connectivity. Satellite or reliever fields will be used significantly by air carriers with some form of governmental control.

de Neufville, R Wilson, N Moore, H, III Gelerman, W Landau, U

Massachusetts Institute of Technology Final Rpt. NR72-35, Mar. 1973, 155 pp

Contract DOT-TSC-309

ACKNOWLEDGMENT: NTIS (PB-220646/4)

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01 263929

#### GROUND TRANSPORTATION PLANNING IMPLICATIONS OF AIRLINE SHUTTLE PASSENGERS

The authors have researched ground transportation characteristics of passengers using the Air-Shuttle services provided at LaGuardia Airport by Eastern Airlines, Inc. The research establishes relationships between characteristics of shuttle passengers, comprising about 15 percent of all LaGuardia enplanements, and the other passengers using LaGuardia Airport and Eastern Airlines facilities. Because of the importance business travelers place on convenient scheduled service with minimum interruption from checking into and out of the system, it is anticipated that shuttle-type airline service concepts will emerge in the more heavily traveled air corridors in the future. Data from field surveys have been analyzed relative to the impacts that shuttle travelers at LaGuardia have on the road system, parking facilities, and curb frontages at terminal buildings. Results indicate that shuttle passengers have parking durations about 50 percent less than other terminal passengers and that their parking space demands are about 40 percent less than other system passengers. Other details as to arrival modes, parking durations, vehicle occupancy, duration of parking at curb frontages, and a profile of the shuttle passenger are given.

Whitlock, EM Mirsky, HM LaMagna, F (Smith (Wilbur) and Associates) *Transportation Research Record* No. 499, 1974, pp 47-57, 10 Fig., 6 Tab., 8 Ref.

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01 263930

#### SYSTEMS ANALYSIS OF GROUND TRANSPORTATION AT MAJOR U.S. AIRPORTS

Of the 746 airports in the United States served by commercial carriers, 20 serve 64 percent of all commercial passenger movements. Of these 20, about 15 are plagued by ground transportation congestion and delay due to the intense concentration of both vehicle and person activity influenced by the airport and its surrounding land uses. The basic congestion problem at airports relates to the difference between the capacities of its two primary interfaces used for airport operation (ground transport versus air transport). Ground transportation systems usually constrain the capacity of the overall system. This paper is based on the results of the Airport Access/Egress Systems Study (1972-1973) sponsored by the U.S. Department of Transportation. The project studied those 34 U.S. airports projected to be serving more than 2.0 million annual enplaned passengers by 1980 in order to ascertain the types and status of their ground transportation problems to be better able to recommend positive solutions. This paper reports on the data for the top 20 of these airports.

Whitlock, EM Sanders, DB (Smith (Wilbur) and Associates) *Transportation Research Record* No. 499, 1974, pp 58-69, 6 Fig., 4 Tab., 14 Ref.

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01 265475

## THE REMOTE AIRPORT: A STUDY OF ACCESS FEASIBILITY

The present airport to city center distances are stated for those airports that are 22.5 km (14 miles) or more from city centers, and the travel times required for access and average speeds at peak and off-peak hours are reported. It is then pointed out that pressures for increased capacity are forcing location of new airports at increasing distances from cities, and the term "remote airport" is defined as those at distances in the range of 40 km to 80 km (25 miles to 50 miles). The need for a means of access that will not require excessive travel time is recognized, and costs of two modes of STOL aircraft from downtown STOLports, and rail rapid transit, are analyzed and compared to capital and operating costs.

Miller, DR Dellaway, TK Holden, WHT (Daniel, Mann, Johnson and Mendenhall) *ASCE Journal of Transportation Engineering* Vol. 100

No. TE1, Proc. Paper 10359, Feb. 1974, pp 179-194, 4 Fig., 5 Tab., 11 Ref., 1 App.

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01 265478

## HOUSTON AIRPORT'S LOW COST PEOPLE-MOVER

A description is given of the new automatic, electric powered transportation system linking the two airport terminals and hotel. It replaces a first generation, battery powered system which has been in operation since the airport was completed in 1969. Six trains, 36 passengers each, operate continuously on a 6,000-ft (1,830-m) loop, providing service at each of eight stations every 3 min. Cost, including new station gate sets and graphics, was less than \$1,000,000. Overall airport traffic circulation, including the role of the train system, is considered. A description is made of major components; vehicles, suspension, guidance, propulsion, braking, switching, station gates, power distribution, and controls. Figures are presented to illustrate the text.

Puckett, HK Williamson, JC (Lockwood, Andrews and Newman, Incorporated) *ASCE Journal of Transportation Engineering* Vol. 100 No. TE1, Proc. Paper 10330, Feb. 1974, pp 255-262, 5 Fig.

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## Chapter 2

# AIRPORT ECONOMICS AND FINANCE

02 074545

### A LINEAR PROGRAMMING APPROACH TO AIRPORT CONGESTION

This paper attempts to develop several linear programming models to examine the use of landing fees as a price mechanism to allocate its facilities to potential users. The models scope is restricted in three ways: The focus of attention is on congestion at a single airport; congestion will only include arriving flights at the airport, and analysis is limited to some small time period. The airport operations model will be divided into subintervals of time of length. Groups which wish to land planes at the airport during a given time period will be required to submit to the airport bids to land aircraft during that time period. These bids will indicate how much each bidder is willing to pay per plane for landing rights. The airport then must select a price for landing rights for each time period so that the number of planes that want to land each time period does not exceed the capacity of the airport. In this way the airport will use the price mechanism to allocate its resources to the potential users.

Kiefer, DW

Purdue University 267, Feb. 1970

ACKNOWLEDGMENT: Flight Transportation Laboratory, MIT (FTL 3-5)  
ORDER FROM: Massachusetts Institute of Technology, Flight Transportation Laboratory, Cambridge, Massachusetts, 02139

02 131159

### ECONOMIC AND FINANCIAL ASPECTS OF AIRPORT LANDSIDE DEVELOPMENT AND OPERATION

The consideration of airport landside capacity and operations relies on 2 points: (a) the identification of the key economic and financial issues related to airport landside investment and operations and (b) the analysis of these issues as they concern both long-term and short-term decision making. Although the principles and issues identified and analyzed are broad and have general applicability, this discussion will be stated in terms that are most relevant for U.S. airport development. In the United States, almost all carrier-served facilities are operated by public authorities of one sort or another, and no single airport operator controls any great proportion of total national airport capacity. The economic and financial issues to be considered relate to both the establishment of new airport landside facilities and the expansion or modification of the capacity of existing airport landside installations. /Author/

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

Gellman, A (Gellman Research Associates, Incorporated) Duggan, LF, Discussor (Airport Operators Council International, Inc) *Transportation Research Board Special Reports* No. 159, 1975, pp 35-61, 1 Ref.

ORDER FROM: TRB Publications Off

02 152874

### CONSIDERATIONS IN SETTING AIRPORT USER CHARGES IN CANADA

Airports present opportunities to government to further many desirable aims. Decisions on building and operating airports may be taken for reasons additional to provide a place for aircraft to land and take-off. The aims of air carriers are much simpler than those of government. They are concerned with market forces, not social forces. They desire airport facilities that would be responsive to demonstrable need, and supplied at market prices. This paper points to a set of principles for the setting of user charges upon which the interests of airlines and government might be reconciled. /TRRL/

Air Transport Association of Canada Report Feb. 1976, Figs., Tabs.

ACKNOWLEDGMENT: TRRL (IRRD-222686), Roads and Transportation Association of Canada (RTAC02138E)

ORDER FROM: Roads and Transportation Association of Canada, 1765 St Laurent Boulevard, Ottawa, Ontario K1G 3V4, Canada

02 155480

### RUNWAY CONGESTION COST PRICING REVISITED

Six papers are surveyed which focus on air carrier airports where peaking is periodic, discuss the economic efficiency of runway use, and propose prices as a means of improving efficiency. The paper by Grampp proposes that rights to use the runway at certain times be either sold at auction by the

airport or issued to existing users and made transferable so that a market would form where the rights would be bought and sold. Levine's approach to peak pricing is that a quality of service be specified (a probable level of day) and landing fees be adjusted so as to reduce delays to this level during the peak periods. Yance's paper proposes a system of peak load prices in the form of landing and take off fees. Warford in his paper emphasized the tying of the pricing scheme to facility expansion. Minasian and Eckert focus on the potential of prices for reducing peak demand for runway access and the consequent postponement of the need for facility expansion. Carlin and Park discuss in detail the theoretical aspects of congestion cost pricing, compute prices in specific situations and consider the problems of implementation.

Piper, RR *Transportation Journal* Vol. 13 No. 1, Sept. 1973, pp 51-58

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155481

### ECONOMIC IMPACT OF AIRPORT DEVELOPMENT

The purpose of this thesis is to establish a systematic evaluation and measurement of economic impact of airports on communities, and to gain insight into the nature and size of the economic impact. Regional economic impact of airport development is proposed to be considered as a set of benefits under the regional development objective within the multi-objective evaluation framework. Current methods for the measurement of economic impacts are presented and criticized from both the theoretical and practical point of view. In addition some theories which are applicable to the analysis of economic impacts are presented and shown to be useful. To gain insight into the nature of the subject some case studies are undertaken and empirical examples are extensively compiled. It is shown that economic impact of airport development appears to have been overrated and is, in fact, to be quite local and modest.

Yajima, T

Massachusetts Institute of Technology 1971, 162 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155494

### THE FEASIBILITY OF APPLYING AIRPORT AND AIRWAY TRUST FUND SURPLUS TO NOISE ABATEMENT

The FAA, while presently favoring a Nacelle retrofit program, is seeking the most equitable method of funding. A \$577 Million surplus exists in the Airport and Airway Trust Fund in fiscal 1975 which will grow to over \$4 billion by fiscal 1980. Although those moneys are sought after by the FAA for operational expenses, a viable alternative is to utilize a small portion of this surplus for Nacelle treatment thereby releasing the majority of the surplus for other purposes appropriated by Congress.

Dubrow, RB

Massachusetts Institute of Technology 1974, 169 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155496

### THE FINANCING OF AIRPORTS

Some of the major problems arising in the field of airport financing are discussed. The extent of capital investment funds needed by an airport depends not only on the amount of traffic, and the expected growth, but also on what facilities the airport plans to finance and what facilities are to be financed by third parties. Other circumstances (on which the airport has little influence) which could determine financing requirements are also listed. Uncertainties which can be introduced by the delays in obtaining planning permission and the starting date of construction work are discussed. The application of commercial principles to airport operation is discussed with reference to the situation in the Federal Republic of Germany. Comments are made on the financing of expenditure by shareholders. The question of whether the airport should be privately run, and the question of adequate security for loans from credit organizations are considered. The reasons why some airports are profitable and others are not are noted, and the reasons why some airports have deteriorated in recent years are listed.

von Laun, K *Airport Forum* Vol. 1 No. 4, Dec. 1971, pp 71-84

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155508

## AIRPORT PRICES--THEORY AND PRACTICE

To achieve the optimal use of economic resources all services should be priced, and prices should be no greater than or no less than the value of the alternative services which could be achieved with the same resources. Four economic characteristics of airports which are of significance in pricing policy and financial management are listed: airports are capital-intensive; capital assets are large and indivisible; a large part of the operating costs are related to general administration and organization; an airport provides a wide range of services. The following basic rules for economic pricing are suggested: where capital equipment is divisible, charge a price equal to long-run average cost; where capital equipment is indivisible and total demand is less than output charge a price equal to short-run marginal costs; where capital equipment is highly indivisible and total demand equals or exceeds the maximum output, charge the market clearing price. "Economic pricing" versus "sound financial management" is discussed. The characteristics of capital costs and the relationship of demand to capacity are the determining factors in setting prices at long-run average, short-run marginal or the market clearing price. Comments are made on the pricing policy at Heathrow-airport, U.K.

Miller, D (British Airports Authority) *Airports International* No. 28, July 1973, pp 12-14

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155523

## ECONOMIC ASPECTS OF THE AIRPORT ENVIRONMENT: NOISE, AIR POLLUTION, AND CONGESTION

No Abstract.

Nelson, JP (Pennsylvania State University, University Park)  
Council of Planning Librarians No. 343, 1972, 18 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155526

## ELEMENTS OF MUNICIPAL DEBT FINANCING AS RELATED TO CONSTRUCTION OF AIRPORT FACILITIES

The authorized tools (general-obligation bonds; non-guaranteed bonds) for municipal debt financing are considered, and the characteristics of general-obligation and revenue bonds are compared and contrasted. The federal income tax exemption of all municipal securities are discussed, and the numerous terms, topics, and other matters related to municipal bond financing are defined. Other aspects covered here include, among others, marketing procedures, and the security aspects related to revenue bonds.

From Airport Economic Planning by G.P. Howard.

Voss, HW (Voss (Howard W) and Associates) *Massachusetts Institute of Technology Press* 1974, pp 283-294

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155527

## REVENUES IN THE TERMINAL AREA

Accounts at a number of airports of varying traffic levels were examined, and it was found that in general, for the larger airports, terminal area revenues constitute two-thirds of total airport revenues. This ratio decreases as airport size decreases in terms of passengers handled, and for non-hub airports it drops substantially. However, it costs a great deal to generate this revenue. It has been estimated that approximately 75 percent of the total funds will be required for terminal area development. A graph is used to illustrate terminal area revenues compared to airport size. It is noted that 25 percent of terminal revenues (17 percent of total airport revenues) are accounted for by space rentals; 75 percent are concession revenues. The different types of terminal concessions are discussed.

From Airport Economic Planning by G.P. Howard.

Knowles, RC (Speas (R. Dixon) Associates)  
Massachusetts Institute of Technology Press 1974, pp 488-502

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155600

## CURRENT PROBLEMS RELATED TO AIRPORT FINANCING

Problems related to airport management's ability to obtain money to finance physical facilities to accommodate the rapid growth in air transportation are

discussed. The lack of market for good quality bonds because of interest rate limitations by governing bodies is considered, as well as the situation with municipal bond prices, and the short-term money market for interim financing. The advantages of the latter approach seems now to be outweighed by the risk of the bond market continuing to decline. Possible changes in the existing tax-exemption of interest derived from state and municipal obligations are discussed and comments are made on the tax-exempt status of airport bonds. The development of airport authorities is noted, and non-profit corporations are considered as a practical approach to financing.

Martin, FF (Halsey, Stuart and Company, Incorporated) *Airport Services Management* Vol. 10 No. 1, Jan. 1970, pp 32-36

ACKNOWLEDGMENT: Federal Aviation Administration Library

02 155615

## AIRPORTS AND CONGESTION: A PROBLEM OF MISPLACED SUBSIDIES

Although federal airport subsidy programs have strong adherents, the case in favor of them is an uneasy one. The beneficiaries of these subsidies are mainly higher income groups. The is no reason to suppose that airports and aviation make a contribution to the nation's economic growth that is more important than many nonsubsidized industries. Airports also create costs in the form of noise, air, and water pollution which suggest that their activities might be taxed rather than subsidized. For the purpose of this paper, however, one of the most important arguments against subsidies is that they increase congestion rather than reduce it. Charging below-cost prices also creates new users who lobby in behalf of continuing subsidies. Recent court decisions indicate that the pricing of airport services is legal. Pricing systems could be of two kinds. The first would impose peak-hour landing fees. These fees would have to be adjusted from time to time according to a "trial-and-error" procedure until queues declined to desired levels. The second kind would create landing rights or slots that would be vested in current users and be fully transferable. This would allow higher-valued users to purchase slots from lower-valued users, and thus improve airport efficiency. The rights need not be given in perpetuity. They could be renewable permits granted for 3-year periods. Neither of these pricing systems is likely to present large problems in implementation. But some experience with their operation could be gained through experiments at two or three airports that might last up to three years. The experiments could be funded under the planning grant authority of Public Law 91-258. They would produce information on the nature of airport demand, the extent to which prices can reduce congestion, and any unforeseen problems in administration.

Eckert, RD (University of Southern California)  
American Enterprise Inst for Public Policy Res 1972, 71 pp

ACKNOWLEDGMENT: Federal Aviation Administration Library

02 155630

## EASTERN PLACES THREE-YEAR COST OF TRAFFIC DELAYS AT \$137 MILLION

A report on the economic effects of air traffic congestion shows that both excessive operating costs, resulting from growth in block times, and aircraft utilization losses resulting from unproductive operating hours have contributed to the total cost of air traffic delays. Three principle items are identified in the computations. Ground waiting time, or out of time; the product of unproductive hours (time spent waiting in line to take off) multiplied by out-off cost per hour is the excess cost attributed to unproductive out-of-time. Airborne time was derived from equations that yielded the difference in minutes in flight time between early-morning Boeing 727 cargo flights and daytime passenger flights. The average difference in minutes in flight time between the early morning hours and congested times of day was computed and utilized in the derivation of unproductive airborne hours for each year. The computation of aircraft utilization loss is also detailed.

Stein, KS *Aviation Week and Space Technology* Vol. 92 No. 17, Apr. 1970, pp 30-31

ACKNOWLEDGMENT: Massachusetts Institute of Technology



02 155635

**NORTHEAST CORRIDOR AIR TRAFFIC AND HIGH SPEED GROUND TRANSPORTATION**

This report reviews the high-speed ground transportation program of the Department of Transportation and studies the impact high-speed rail passenger service may have on air traffic in this critical, congested area of the United States known as the Northeast Corridor. Preliminary high-speed rail demonstration programs are being operated in the Boston-New York-Washington markets. These may be followed by full-scale operating systems incorporating faster, more convenient, more comfortable, and higher quality rail service than ever before in this vital section of the U.S. In the first year of operation, almost 605,000 passengers used the Metroliner for all city pairs along the New York-Washington route. Business grew steadily throughout the year as schedules increased from one round trip initially, to three daily round trips for about nine months, and finally to six round trips a day for the last three months. The Metroliner had a stimulating effect on total rail passenger volume in the Washington-New York corridor. For the first time in years, the downward trend halted and 1969 recorded a seven percent increase over 1968. Total rail passengers (Metroliner and conventional trains combined) moved up from 6,976,000 in 1968 to 7,483,000 in 1969. Total air passenger volume in the same Washington-New York corridor flattened out in 1969 at the 1968 level--1,909,000 passengers in 1969 against 1,901,000 in 1968. Department of Transportation surveys of New York-Washington Metroliner and airline passengers during 1969 indicate strong similarities in socio-economic characteristics--income, age, and purpose of trip. With a distinct price advantage (\$15.75 Metroliner vs. \$23.10 air shuttle) and relatively comparable total travel time from downtown to downtown, the improved high-speed train should continue to attract a growing volume as more daily trips are provided. The preliminary nature of available data and of the forecasts for both STOL and rail operations makes it mandatory that aviation facility planners closely monitor trends in the rail demonstration and in STOL development to assess their effect on traffic distribution among the various transportation modes.

Federal Aviation Administration Mar. 1970, 37 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155651

**MARGINAL COST PRICING OF AIRPORT RUNWAY CAPACITY**

This paper develops marginal delay or congestion costs and explores the use of congestion tolls as a solution to the short-term congestion problem in La Guardia. The study concludes that because of the practical problems involved, equilibrium marginal cost pricing does not appear to be a feasible alternative for allocating runway capacity at La Guardia. The use of proportional marginal cost pricing, however, offers some of the same efficiency advantages without most of the problems. It is preferable, on the grounds of efficiency, to the present weight-based, value of service pricing used at most airports. Use of administrative limits on schedules would be required in conjunction with proportional marginal cost pricing, however, to increase carrier load factors to more efficient levels.

Carlin, A. PARK, RE (Rand Corporation) *American Economic Review* Vol. 60 No. 3, June 1970, pp 310-319, 4 Tab., 11 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155667

**THE NEW PRICING POLICY OF THE BRITISH AIRPORTS AUTHORITY**

The authors set out the new method and scale of charges now in force at Heathrow and Gatwick airports and explain the underlying principles. All-up weight is no longer the sole criterion: fees vary also according to number of passengers, and there a peak surcharge at Heathrow and a minimum landing fee of 2 pounds sterling, increased to 5 pounds sterling at Gatwick during summer weekends. Charter services will pay proportionately more than before. The minimum landing fee is expected to deter some general aviation, leaving more capacity by larger aircraft.

Little, IMD McLeod, KN *Journal of Transport Economics and Policy* Vol. 6 No. 2, May 1972, pp 101-115

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155670

**AIRPORT NOISE AND CONGESTION: A PEAK LOUD PRICING SOLUTION**

This paper derives a systematic method of determining user fees which maximize social welfare within the airport's capacity and noise constraints. Once such a fee structure is developed it then becomes possible to consider the second problem of whether the peak and off-peak demand for the use of the airport justifies additional expenditures on increased capacity if the capacity constraint is indeed the relevant consideration. An efficient fee system may, on the other hand, reveal that the noise condition produced by airport operations is the controlling constraint and that until this problem is resolved further additions to capacity are unjustifiable. A mathematical derivation of an optimal user fee policy is presented in the first section. These fees allocation capacity efficiently between the two types of users for a given time period. By solving this allocation problem we are then able to estimate for that period the shadow price of additional capacity. This shadow price is the amount users in that time period are willing to pay in order to expand current facilities. The shadow prices for capacity generated for each period of time are then employed to determine the optimal capacity. If the noise constraint is relevant in a particular time period shadow prices are generated which indicate the amount users are willing to pay in order to reduce the noise levels of current operations or community objections to them. In the second section these mathematical results are used to develop a graphical procedure which can be applied to calculate the economically efficient fees and the shadow prices for the capacity and noise constraints.

Jackson, R (Brown University) *Applied Economics* Vol. 3 No. 3, 1971, pp 197-203

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155671

**EQUITY IN COST-BENEFIT ANALYSIS. A CASE STUDY OF THE THIRD LONDON AIRPORT**

This paper examines the equity issues arising from this London Airport project, and suggests a model for incorporating these equity considerations in the cost-benefit results. It is assumed that the cost-benefit analyst is free to make the necessary value judgements for this purpose. The reason why equity issues arise in cost-benefit research is considered, and the groups on whom the costs and benefits of the airport will ultimately fall are identified. A model is suggested for recalculating the research team's results to take account of the equity implications. The results of recalculating the team's costs on the basis of the proposed model, and the notations, sources and derivation of the weights used in the model are appended. The problem facing the Roskill Commission (which requested the cost-benefit analysis of the 4 alternative sites for the Third London Airport) was the magnitude of uncompensated losses, irrespective of whether such losses were imposed on the rich or on the poor. It is argued that if one regards equity issues as inseparable from the economic efficiency issues arising from a public project, and if the analyst is allowed to make his assumptions where the political process provides no clear-cut directive, the main equity issues to be taken into account are local rather than national. In the case of the Third London Airport, various aspects of these issues have been suggested in the model for scaling down the benefit to the users or upgrading the costs (disbenefits) to the sufferers. The results of applying these weights to the research teams estimates are summarized in tables.

Nwaneri, VC *Journal of Transport Economics and Policy* Vol. 4 No. 3, Sept. 1970, pp 235-254

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155672

**THE ECONOMICS OF AIRPORT DEVELOPMENT AND CONTROL**

This paper outlines procedures for airport development and control, involving economic decisions on pricing and investment, welfare criteria being used to derive "second-best" solutions within a constrained situation. A general solution for both static and dynamic optimization is developed, and a numerical illustration is given. The resulting methodology has applications beyond the airport context. The welfare measure used in this paper is economic surplus. The methodology is flexible, and can simply be extended in spatial and dynamic terms to produce an analytical framework for the exploration of scale economies, regional planning, and so on. The strength of the approach lies in the integration of the demand and supply



functions, not only through the airport price, but also through airline schedules, market systems and the direct effect of capacity provision upon journey cost. It is concluded that the correct pricing solution will be based exclusively upon short-run costs—a particularly important element being congestion—but errors in pricing policy will not cause great welfare loss. The expansion criterion, however, is extremely important, and the existing criteria may lead to misleading planning dates for expansion and consequently large welfare losses. As far as this optimising process is concerned noise costs can be treated like any other component of systems costs (G), the real problem being their measurement and possible "weighting", and there is nothing useful that can be added to the argument within the scope of this paper. Much more serious is the possible distortion contained in the attempt to plan the airports separately from the airways and aircraft which they serve. In other words, we should plan the whole air transport system as an integrated whole, rather than wag the dog with a somewhat ineffectual tail.

Fitzgerald, EVK Aneuryn-Evans, GB (Cambridge University, England) *Journal of Transport Economics and Policy* Vol. 7 No. 3, Sept. 1973, pp 269-281

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155673

**A CASE STUDY OF THE EFFECTS OF AN AIRPORT ON LAND VALUES**

This paper presents and tries to interpret some new evidence on the effect of an airport on the market price of real estate. This is done by comparing one area adjacent to Toronto International Airport (Malton) with similar areas in Metropolitan Toronto during the period 1955 to 1969. This time span encompasses a number of major airport expansions, the introduction of jets, and a general growth in aviation activity. A model is also outlined. The results of this study are reasonably clear in confirming the model originally postulated. Statistically significant differences exist in the pattern of price changes in the vicinity of the airport compared with non-airport areas. The evidence suggests that residential land values fall during periods of substantial change, but that after the change they increase to approximately their previously established long-run trend. While one might be concerned that the evidence presented here is insufficient to reject the null hypothesis that airports have no effect on land values, there can be no doubt that it brings the validity of the hypothesis into question. A more likely explanation than the null hypothesis is that during a "shock" period noise-avoiders sell their residential property, driving down the prices; noise-indifferent people move in and some land is shifted to other uses, thus, in turn, bidding up the price. The overall result of this process is that relative land values ultimately end up about the same as before the shock. The important difference is that the type of residents and the pattern of land use (the "economicscape") change substantially.

Crowley, RW (Ministry of State for Urban Affairs, Canada) *Journal of Transport Economics and Policy* Vol. 7 No. 2, May 1973, p 144

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155675

**THE TIMING OF INVESTMENTS IN AIRPORT CAPACITY. THE CASE OF LONDON**

One of the more important aspects of the analysis of a large investment project, such as the Third London Airport, is that of determining the optimal starting date. In this paper the criteria used by the Commission on the Third London Airport will be examined, and an alternative approach suggested. After examining the Research Team's Assessment, it is suggested that their methods of calculating the benefits from bringing forward the construction of the Third London Airport have resulted in overestimates. It is suggested that the starting date should be two, or possibly more, years later than the Research Team suggests. To a large extent the benefits will depend on what policies the authorities adopt to control the excess demand that will emerge, but it is arguable that the benefits are overestimated even on the unlikely assumption that nothing is done. The appropriate starting date of the Third Airport depends on many factors other than those mentioned here. For example, the forecasts of the growth in demand have been taken without question, yet these could be much in error. The pricing system used by airlines will affect demand for air travel and for airport facilities, and this system is at present being altered. As the degree of uncertainty is large at present, but will diminish as the starting date becomes

nearer, there is a good case for postponing the decision on timing as long as possible and for continuously revising the estimate of the optimal starting date as more data become available. Rather than estimate delays which would almost certainly not be allowed to come about, it would be more productive to attempt to estimate a pricing structure for future demand levels which would keep demand in any period within capacity, and to calculate the social losses that this would entail. It would also be necessary to calculate the extent to which the extra capacity would be inferior to existing capacity, and the prices that would have to be charged to ensure its use. It could be argued that the starting date is not very sensitive to the level of costs, since costs approximately double each year. Even if costs are estimated to be twice as high in one case as in another, this will produce a change in the starting date of only one year. However, at the same time, a rapidly increasing cost function also implies that the cost of building at the wrong time is very large. The choice of when to build the airport is not much affected by the unquantifiable factors that were so important in the choice of where to build it; economic analysis can provide relatively unambiguous answers. Furthermore, the magnitude of the costs and benefits of a particular timing decision are quite significant in themselves, and considerably exceed those of projects which have been analysed much more thoroughly.

Forsyth, PJ *Journal of Transport Economics and Policy* Vol. 6 No. 1, Jan. 1972, pp 51-68

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155678

**WORLD BANK SUPPORT FOR AIRPORTS**

The World Bank, which helps to finance numerous major projects in developing countries each month, has so far taken little share in airport construction. In fact, it is only since 1971 that these transport facilities have had any part at all in the Bank's activities. This article explains some of the reasons for this situation and describes briefly the three biggest projects to date: Nairobi Airport, Public of Kenya. Construction of a passenger terminal, a freight terminal, also aprons, taxiways, parking places, airport roads, tower, police and fire station, lighting, power supply, drainage, fencing. Dakan Airport, Senegal, lengthening of main runway plus lighting, two aircraft parking positions, resiting of localizer. Ixtapa, Mexico, creation of infrastructure for the establishment of a new tourist center in Ixtapa, including construction of an international airport.

Bostrom, B (International Bank for Reconstruction & Development) *Airport Forum* No. 3, Sept. 1973, pp 57-60

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155689

**STUDY OF THE FINANCIAL ASPECTS OF AIRPORT OPERATION**

Despite its current slump the growth rate of air traffic is expected to continue, and with it a growing demand on the nation's airports. In order to cope with growth, airports must be able to finance expansions. It is the aim of this study to outline the inner workings of an airport's economics and finances, and to update data currently in circulation on them. The thesis is divided into six chapters. Chapter One lays the ground work for what follows. It deals with various theories of airport economics; namely those concerned with financial objectives, and pricing policies. Chapter Two examines airport revenues, and presents average data for them as to their amounts and the methods employed in their collection. In addition, Chapter Two looks into the operation of three types of concessions: advertising; car rentals; and restaurants. Chapter Three discusses the expenses an airport incurs. Included in this Chapter are specific construction costs for Logan International Airport (Boston). Chapter Four compares the results of Chapters Two and Three, and shows the profits or losses that various categories of airports encounter. Chapter Five reviews the methods of financing used by airport operators. Finally, Chapter Six explores the finances of the airports at: Los Angeles, California; El Paso, Texas; and Portland, Maine.

Baumli, SF  
Massachusetts Institute of Technology MS Thesis 145 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155696

**ECONOMIC IMPACT OF AIRPORT INVESTMENT AND USE IN NORTH CAROLINA**

This paper seeks to answer the questions: does airport investment and use have any perceptible general impact on area economies? If so what are its dimensions? A quantitative approach (which would investigate the statistical relationship between regional economic or activity levels in the airport service area and measures of airport investment or aviation activity) was used to analyze the economic impact in this study. It was hypothesized that the variations in aviation investment and activity could explain variations at the county level of economic growth and activity. The statistical relationship was established and measured by a cross-sectional analysis of the 100 counties in North Carolina in 3 separate analyses. The first 2 of these analyses employed per capita retail sales as the dependent variable of economic growth. In these long-run analyses, the incremental investment was related to the change in per capita sales over time. Third analysis used total retail sales as the dependent variable measuring the level of economic activity. The analysis attempted to assess the relative impact of the aviation variables on retail sales in any one year when other explanatory variables (population and employment) were included in the equation. Although the impact of airport investment is too small to be identified in any one year, over a long period, there appears to be a positive relationship between airport investment and economic growth. The payout of airport investment for North Carolina over the period tested (1958-1969) equated to 3.8 percent of the total economic growth as measured by the change in retail sales per capita.

Martin, JN (Banks (RL) and Associates, Incorporated) *Transportation Journal* Vol. 11 No. 3, Apr. 1972, pp 46-52, 3 Tab.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155715

**ANALYZING AIRPORT ECONOMIC BENEFITS**

International lending institutions finance many highways and roads, railroads and seaports, but very few airports. There are numerous reasons for this situation, but this article focuses on the reason that the economics profession has not yet determined a methodology and approach that produces an acceptably rigorous economic evaluation for an airport.

Prentice, ES (NACO Netherlands Airport Consultants) *Airport Forum* Vol. 4 No. 3, Oct. 1974

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155724

**THE ECONOMICS OF AIRPORT OPERATION AS AFFECTED BY TRANSPORT AIRCRAFT DESIGN TRENDS**

It is noted that wide changes of aircraft design criteria can affect costs in areas connected with the pure aircraft engineering and operational environment. Presently, there is some danger that fully automated landings (which require increased runway lengths) are increasingly the importance of landing criteria over that of take-off as the critical runway length requirement. This, together with the effect of the antenna height of some aircraft receiving equipment, results in further increase in total requirements. Coordination of these matters is necessary to ensure that they are taken into account in the early stages of aircraft design. Further areas in which economies could be achieved are discussed. These include: the standardization of maximum turn radii; aircraft wheel loadings; automatic landing and automatic braking research which could lead to higher runway utilization and reduction of the number of fast turnoffs; design of parking areas—future aircraft design should allow for simply push-out operation with existing equipment; nosed-in, adjacent parking of aircraft; the location of aircraft passenger doors; baggage handling which affects apron design and parking; and commissary loading positions. The need is indicated for standardization related to fuelling points, as well as the need for effective cooperation between aircraft constructors, airline operators and airport authorities on design matters which could affect costs.

Read, RA (Glasgow Airport) *Aeronautical Journal* Vol. 75 No. 728, Aug. 1971, pp 535-538, 7 Fig.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

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02 155725

**INTERNATIONAL AIRPORTS ALLOCATION OF OPERATING REVENUE AND COSTS**

Allocatable revenues to the North Atlantic operation at the 13 Canadian airports, produced for the fiscal year 1966/67 a total of \$18,160,500 whereas the corresponding total for the allocatable costs emerges as \$8,265,140. This points out an allocatable deficit of \$104,640. It is noticeable that the allocatable deficit to the North Atlantic operation of the six alternate airports was only \$77,918, although the total deficit at these airports was as high as \$7,730,118. Thus, the stand-by cost of the facilities at these airports was not allocated at all to the North Atlantic Operation. It might be argued that at least the stand-by cost of the capital investment i.e. the interest and the depreciation should be considered for allocation. It would not be unreasonable to allocate the capital charges of these six alternate airports which added up to \$4,184,269, on the basis of the average gross-weight of the aircraft using these airports during the North Atlantic landings over the same period. This works out to an additional cost for allocation that was not included in the table in the order of \$3.1M. Another method of allocating alternate airport costs would be add them into one total. From this total cost the alternates total revenues excluding landing fees should be deducted. Finally, the adjusted cost to be multiplied by the ratio of the aircraft gross-weight for the North Atlantic landings and the total gross-weight for all landings. For the six Canadian alternates in the North Atlantic region, this method produces an allocatable cost to the international service in the order of \$1.3M for the fiscal year 1966/67. And the method might be expanded to a theoretical ideal by encompassing international small alternates from all States in the region and the aircrafts total traffic in the region. But it would require a unilateral agreement among the States. A precedent is likely to occur, because a multilateral agreement might be accomplished in the near future in respect of the charges for the international air routes in general, in view of the fact that it was announced by the Eurocontrol for the European region, effective 1st November 1971.

Jaworski, A (Department of Transport, Canada) *Aeronautical Journal* Vol. 75 No. 726, June 1971, pp 427-430, 1 Tab.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

02 155727

**ESTABLISHING AIRPORT COST AND REVENUE FUNCTIONS**

This paper is to presents the findings of a detailed financial and economic analysis of eighteen of the larger British airports. These findings are a initiative step in the building up of a theory of airport economics. The analysis is based on detailed traffic and financial data compiled from questionnaires and a result of direct visits to all the airports in the sample. The eighteen airports covered are more than a mere sample, since taken together they account for about 95% of the air transport movements, of the passengers handled and of the freight traffic of all United Kingdom airports outside the Channel Islands.

Doganis, RS (Polytechnic of Central London) Thompson, GF (The Open University) *Aeronautical Journal* Vol. 78 No. 763, July 1974, pp 285-304, 10 Fig., 7 Tab., 10 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

02 155730

**GOALS AND OBJECTIVES OF AIRPORT ACCOUNTING**

The functions of accounting are defined and the various airport services and their relationship to accounting are reviewed. Airport lease policy, cost accounting distinctions between airport areas, and airport management goals are discussed. Two broad categories of accounting reporting are the internal report and the public report. Objectives of these two areas of reporting are described, and six specific reporting functions (budgetary process and preparation, public financial statements, assembling costs for establishing pricing, control and record capital expenditures, reports to bond holders, forecasting future revenues) are discussed. Comments are made on the measurement of airport management's efficiency, the allocation of indirect expenses (joint costs), depreciation practices and other problems. An airport accounting system should be designed to record, accumulate and periodically report financial data pertaining to the major business functions or services provided at the airport. Procedures for allocating indirect expenses to the primary airport cost centers should be specified so that the



system can (1) report the results of operation of each of the various airport businesses, and (2) provide adequate data for establishing and periodically adjusting tenant and user rates and charges.

From Airport Economic Planning by G.P. Howard.

Joerger, RK (Peat, Marwick, Mitchell and Company)  
Massachusetts Institute of Technology Press 1974, pp 332-343

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155731

## CAN THE QUALITY OF AIRPORT FINANCING BE IMPROVED?

It is noted that over \$15 billion will be required from the bond market for airport development during the next 10 years. The article comments on the predominant trend in municipal finance to issue revenue bonds rather than general obligation bonds.

From Airport Economic Planning by G.O. Howard.

Martin, FF (Halsey, Stuart and Company, Incorporated)  
Massachusetts Institute of Technology Press 1974, pp 301-311

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155732

## THE ECONOMICS OF AIRPORT DEMAND AND PRICING

The scarcity of airport resources is discussed, and comments are made on the nature of airport demand. The reduction of airport congestion by adding to capacity, as well as pricing techniques to reduce congestion are considered. Variable landing fees are suggested as a possible solution. Landing fee structure which encourages wasteful use of airport resources, and the benefits from congestion charges are discussed at some length. New York is presented as a case study of increased landing fees, and the special problem of general aviation is discussed. Selective changes in airline ticket prices are also suggested as a mechanism for shifting airport use to slack periods. Rationing runway use by price rather than by willingness to tolerate delay would allow higher-valued users to bid landing time away from lower-valued users, who would shift their operations to less desired times and locations. The success of the implementation of peak-time charges in New York is noted. Peak-time airline ticket pricing (instituted in New York) deserves consideration as a congestion-reducing device.

From Airport Economic Planning by G.P. Howard.

Eckert, RD (University of Southern California)  
Massachusetts Institute of Technology Press 1974, pp 420-444, 2 Fig.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155733

## PRICING AIRFIELD SERVICES

The purpose of this discussion is to explore some of the "normative" aspects of the pricing of airport services. The term "normative" here refers to theoretical economic conceptions of how services should be, not how they are, priced. This discussion is limited by the precept that price should be related to cost.

From Airport Economic Planning by G.P. Howard.

Dygart, PK  
Massachusetts Institute of Technology Press 1974, pp 392-419, 1 Fig., 3 Tab.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155734

## BOND COVENANT FROM THE ISSUER'S VIEWPOINT

This article considers the fact that the local governmental agencies who operate airports must have some authorization to issue revenue bonds, and discusses the case in Los Angeles where the city charter was amended to give the Board of Airport Commissioners authority to issue revenue bonds. The various aspects of a desirable covenant are set forth. The amount of coverage and the maintenance of rates to provide for the operation and maintenance of the facilities are discussed and comments are made on the problem of readjustment of rentals, leases, fees, etc. every three years. The no-priority covenant and the "restriction and additional indebtedness" covenant are also covered. It is noted that if a high coverage ratio such as 1.5 or more has been set under the rate covenant, the same high ratio probably must be used for new debt. It is pointed out that the definite permission contained

in the covenant that future revenues may be derived from facilities to be constructed with new money is important, as such revenue will undoubtedly be needed to fulfill the required coverage ratio for the total debt.

From Airport Economic Planning by G.P. Howard.

Dannenbrink, TD (Los Angeles City, Department of Airports)  
Massachusetts Institute of Technology Press 1974, pp 295-300

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155735

## THE ECONOMIC EVALUATION OF INVESTMENT IN AIRPORTS

Evaluating public investment projects involves the kinds of information and criteria that can be used to decide (a) whether or not a project should be undertaken and (b) which of a set of alternative projects should be chosen. The basic criterion is the maximization of gain on the part of society or the agency or department: the level at which the decision is made makes some difference in the way they are used. A formula is used to express the basic relationships in the present net worth of a project, and certain items are considered in detail: revenue stream, benefits, realistic values placed on benefits, the expense stream, dealing with uncertainty, the cutoff period, and the rate of discount. Indirect benefits and costs (spillovers) are discussed, as well as such aspects as the value of human life, and inflation. The question of the conditions under which secondary benefits should be included in the revenue stream is considered as well as the comparison of projects within the same region and in different regions. A set of rules is suggested for choosing a rate of discount, and suggestions are made for handling uncertainty. The problem of deciding how much money to spend on uncertain prospects, and the problem of investing a fixed budget in the best way are also discussed. Comments are made on the importance of the re-investment rate.

From Airport Economic Planning by G.P. Howard.

Break, GF (California University, Berkeley)  
Massachusetts Institute of Technology Press 1974, pp 517-541, 3 Fig., 2 Tab.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155736

## PRICING AIRPORT FACILITIES

The expenses and revenues of an airport are traditionally broken down into these major categories: (1) hangar area, (2) terminal building area, and (3) landing area. The pricing of the services offered in each of these areas requires a different analysis, and is therefore, dealt with in three separate sections of this paper. The analysis is performed with the economic objective of an optimum allocation of resources in mind.

From Airport Economic Planning by G.P. Howard.

Bess, HD Marcus, HS Nash, TW (Hawaii University)  
Massachusetts Institute of Technology Press 1974, pp 479-487

02 155737

## HOW THEY'RE FINANCING THE BIG CITY AIRPORTS

Airport revenue bonds which now finance new construction and improvements to existing fields, are issued by the airport with the promise that income to the airport will be used to pay it off. This article describes how these bonds are used to finance airport construction, the financing arrangements at representative airports, airport income and expenses, and government aid to airports. The revenue bonds which are usually issued for 25- or 30-year terms, have interest rates ranging from 5 to 9 percent. A bond issued can be sold competitively with the airport accepting bids and selling the issue to the bond house. The Dallas/Fort Worth Airport project, calculated to cost \$380 million for the first stage, is being financed largely through revenue bonds. The costing technique at Houston Intercontinental Airport involves setting airline landing fees and space rentals at a rate that will repay the capital costs and cover maintenance and operating expenses. Financing arrangements at Tampa and Amarillo, Texas are also discussed. The Federal Aviation Administration's aid for airports, the Federal Aid Airport Program, and Airport Development Aid Program are discussed.

From Airport Economic Planning by G.P. Howard.

Massachusetts Institute of Technology Press 1974, p 247, 2 Tab.

ACKNOWLEDGMENT: Massachusetts Institute of Technology



02 155751

**AIRPORTS AND TOURISM ON TWO PACIFIC ISLANDS**

The author, studying the thesis that there is a beneficial impact from tourism on "developing countries", considers the impact of tourism on the socio-economic character of two Western Pacific Islands, namely, Guam, U.S. territory, and Saipan, a part of the trust territory of the Pacific Islands. Air transportation and airport facilities required to accommodate the tourist traffic are discussed.

From the Challenging Future. Proceedings of the 5th World Airports Conference, Brighton, England, 5-7 May 1976.

Fisher, L.

Institution of Civil Engineers Proceeding 1976, 13 pp, 8 Ref.

ACKNOWLEDGMENT: International Aerospace Abstracts

ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-46538

02 155798

**AIRPORT ECONOMICS AND FINANCING**

Due to the recent economic recession, both airlines and (to a lesser degree) airports have suffered financially. Airlines and airports are in a high fixed cost industry, so they can make very good profits when operating at capacity and when they are not over-invested. The British Airport Authority has demonstrated that good profits allow an airport to be self financing, thereby reducing the requirement to borrow. The basic principles of airport finance are discussed, and the profit objective is outlined. Various methods of financing airport developments, including grants, self generated funds, and borrowing, are examined.

The Challenging Future, Proceedings of the 5th World Airports Conference, 5-7 May 1976.

Schroder, BL

Institution of Civil Engineers 1976, 14 pp, 10 Ref.

ACKNOWLEDGMENT: International Aerospace Abstracts

ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-46532

02 155816

**AIRPORT TOTAL SYSTEM, FINAL REPORT**

Six main areas were considered in the study of airports; the general requirements for a simplified model of activity, the nature of air travel demand, demands for airport function, airline provision policy, pricing of airport facilities, and facility investment. Their place in the model was given specific attention. Emphasis was placed upon two main areas; the relevance of a purely output-based airport typology and the relationships between output, typology, predictability, and investment.

Boothby, J McGinity, PD Ashford, NJ

Loughborough University of Technology, England No Date, 75 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

02 155822

**ANALYSIS OF GENERAL AVIATION AIRPORTS DEVELOPED WITH AND WITHOUT FEDERAL FINANCIAL ASSISTANCE, FINAL REPORT**

The report summarizes three separate tasks involved in an analysis of United States general aviation airports. The principal aim is to identify differences and to study the impact of those differences on program effectiveness. The results may be useful in determining modifications which would be helpful.

Burns and McDonnell May 1975, 25 pp

Contract DOT-FA74WA-3434

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

02 155823

**ANALYSIS OF GENERAL AVIATION AIRPORTS DEVELOPED WITH AND WITHOUT FEDERAL FINANCIAL ASSISTANCE, TASK 1. SUMMARY REPORT**

The report covers the first of three tasks designed to furnish comparative data on federal and state programs for developing airports. The purpose in the initial effort is to assemble published data on the planning, design, construction, and financing of airports serving small general aviation aircraft; to develop criteria for making comparisons; to identify standards that may provide significant evaluation information; and to identify pairs of airports for physical evaluation.

Burns and McDonnell Aug. 1974

Contract DOT-FA74WA-3434

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

02 155824

**ANALYSIS OF GENERAL AVIATION AIRPORTS DEVELOPED WITH AND WITHOUT FEDERAL FINANCIAL ASSISTANCE. TASK 2 COMPARATIVE ANALYSIS OF SELECTED GENERAL AVIATION AIRPORTS. SUMMARY REPORT**

The report covers the second phase of a three part task. Its purpose is to make a comparative analysis of selected general aviation airports in the United States. Airports chosen are in a number of states, representing either federal or state development programs, and are evaluated to determine the differences inherent in the various programs.

Burns and McDonnell Feb. 1975, 319 pp

Contract DOT-FA74WA-3434

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
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02 155825

**ANALYSIS OF GENERAL AVIATION AIRPORTS DEVELOPED WITH AND WITHOUT FEDERAL FINANCIAL ASSISTANCE. TASK 3 EVALUATION OF FEDERAL STANDARDS AND PROGRAM PROCEDURES, SUMMARY REPORT**

Task 3 of a three-part analysis involves a detailed evaluation of the standards and requirements of Federal Aviation Administration. The object is to identify major factors in the federal program which relates to general aviation airports that refer to effectiveness. The findings are expected to indicate possible modifications or changes to improve the program, and to point out the standards now existing which are indeed effective.

Burns and McDonnell May 1975, 87 pp

Contract DOT-FA74WA-3434

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

02 155859

**DRAFTS OF PROPOSED LEGISLATION TO PROVIDE FOR THE EXPANSION AND IMPROVEMENT OF THE NATIONS AIRPORT AND AIRWAY SYSTEM**

The proposed legislation will provide for the delegation of certain airport development functions to states and airport sponsors to permit financing of airway facilities maintenance from the airport airway trust fund, and for other purposes, and to redistribute the tax burden among aviation users, and for their purpose.

Government Printing Office 1975, 16 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: GPO

02 155889

**AN ECONOMY AIRPORT FOR SANA'A**

Since September, 1973 Sana'a the chief, City of the Arabian Republic of Yemen, has boasted an international airport worthy of the name. After some years of construction work, a complete airport had taken shape where only a more or less paved airstrip had existed before. Total cost was only DM

16.5 million. The project was financed in part by the Federal Republic of Germany.

Dold, EP Moser, R Kiehne, E *Airport Forum* Vol. 4 No. 1, Mar. 1974, p 49

ACKNOWLEDGMENT: Massachusetts Institute of Technology

02 155906

## ECONOMIC CONSEQUENCES OF AIRPORT DEVELOPMENT

The overall economic framework for airport development is briefly discussed, and the employment offered by airports, the urban development required by employees, and the economic advantages and disadvantages of airports are reviewed.

From Airports for the 80's. Proceedings from the 4th World Airports Conference, London.

Lichfield, N

Institution of Civil Engineers Proceeding 1973, pp 155-161

ACKNOWLEDGMENT: International Aerospace Abstracts

02 159574

## USER TAXES AND ALLOCATIONS OF UNITED STATES AIRPORT AND AIRWAY SYSTEM COSTS

This paper summarizes the results of a cost allocation study and describes the separable costs/remaining benefits method for allocating costs to air carrier, general aviation, and military users. The paper also provides a direct comparison of the allocated costs and user revenues from existing airport and airway charges. Large shortfalls in tax recovery are revealed, particularly in the general aviation sector, and the need is indicated for changes in the tax structure.

Dienemann, PF Lago, AM *Journal of Transport Economics and Policy* Vol. 10 No. 1, Jan. 1976, 26 pp, 13 Tab., 15 Ref.

02 159713

## ANALYSIS OF ECONOMIC IMPACT ASSOCIATED WITH DEVELOPMENT OF AN AIRPORT-INDUSTRIAL COMPLEX. (ABRIDGEMENT)

The development is described of the economic impact analysis that formed part of the site evaluation process for the new Louisville Jefferson county airport. Three major sources of direct employment associated with the airport-industrial complex development are identified. Land development, industrial land requirements, and the estimation of airport construction costs are discussed. Comments are made on the development of an economic base employment multiplier, and on a computerized model to calculate the impact of alternative projects on investment, employment, payroll and taxes. The model requires 2 major inputs: construction costs and emplacements. The model was run under 3 sets of conditions: pessimistic, likely and optimistic. The analysis also determined the effect of the airport-industrial development on local tax revenues.

This article appeared in TRB Record 588, Airport and Air Transport Planning.

Jarvis, JJ Unger, VE (Georgia Institute of Technology) Corradino, JC Schimpeler, CC (Schimpeler-Corradino, Associates) *Transportation Research Record* No. 588, 1976, pp 35-37, 2 Ref.

ORDER FROM: TRB Publications Off

02 163487

## AIRPORT AND AIRWAY COST ALLOCATION STUDY. DETERMINATION, ALLOCATION AND RECOVERY OF SYSTEM COSTS. PART 1. REPORT TO THE CONGRESS

The Airport and Airway Development and Revenue Act of 1970 directed the Secretary of Transportation: (1) to determine the costs of the Federal Airport and Airway System; (2) to determine how these costs should be allocated among the various users; and (3) to recommend equitable ways of recovering these costs. The requested information is provided.

Department of Transportation Sept. 1973, 60 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

PB-229826/3

02 163488

## AIRPORT AND AIRWAY COST ALLOCATION STUDY. TECHNICAL SUPPLEMENT TO PART 1 REPORT DEVELOPMENT OF COST BASE AND APPLICATION OF COST ALLOCATION PROCEDURES

This report brings together the essential issues and findings from the study, to provide information on the material presented in the airport and airway cost allocation study part 1 report determination, allocation and recovery of systems costs. It focuses on the costs of the airport and airway system, how the cost base was derived, and reviews the ten cost allocation methods investigated in the course of the study. General setting of cost allocation; benefits/value of service allocation; units of cost allocation; measures of use cost allocations; long-run marginal cost allocation; long-run incremental cost allocation; separate facilities cost allocation; separable cost remaining benefits allocation; cost responsibility allocation; peak/off-peak costs.

Department of Transportation Nov. 1973, 192 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

PB-229404/9

02 163491

## AVIATION COST ALLOCATION STUDY--BENEFITS

No Abstract.

Department of Transportation Working Paper 9, Oct. 1972, 246 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

PB-229309/0

02 163508

## FINANCING THE NEW GENERATION OF AIRPORTS

High costs and the use of unprecedented construction technology may render the traditional methods of financing airports inadequate. Three factors must be taken into consideration in selection a financing mechanism: ownership policy; funding level; and design complexity. Financing of the cost and an unorthodox location introduce the need for unconventional financing methods. The most promising of these has as its keystone the creation of a fund to which all interested airport developers could contribute and which would be used to guarantee bonds issued by those developers for the construction of their airports. The integrity of the fund would in turn be guaranteed by the Federal Government.

Proceedings of the 1st International Conference on Offshore Airport Technology, Bethesda, Maryland, 29 April to 2 May 1973.

Jakobsberg, W

American Institute of Aeronautics and Astronautics Proceeding Vol. 2 1974, pp 29-34

ACKNOWLEDGMENT: EI

02 163509

## NATIONAL TRANSPORTATION STUDY AIRPORT INVESTMENT MODEL USERS MANUAL

No Abstract.

Office of the Secretary of Transportation July 1975, 15 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

02 163535

## THIRD ANNUAL REPORT ON THE FINANCIAL CONDITION AND RESULTS OF THE OPERATION OF THE AIRPORT AND AIRWAY TRUST FUND- ANNUAL REPORT OF THE DEPT OF THE TREASURE TO THE CONGRESS OF THE UNITED STATES

A congressional hearing was conducted to determine the financial condition and results of the operation of the airport and airway trust fund. The report contains comment on the highlights of the fund, data on current and prior year operations and financial condition, and estimated data for the following

fiscal years. Supporting statements include annual and cumulative data on the bases of existing legislation for each fiscal year through fiscal 1978.

Carlock, JK (Department of the Treasury)  
United States Senate 1974, 11 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: GPO



## Chapter 3

# AIRPORT ENVIRONMENTAL IMPACT

03 075396

### AIRCRAFT NOISE IMPACT. PLANNING GUIDELINES FOR LOCAL AGENCIES

This manual interprets the information developed in the Metropolitan Aircraft Noise Abatement Policy Studies reports and other case studies of aircraft noise abatement and presents it in a form that provides a practical tool for the local planner, local government and others in developing a comprehensive aircraft noise abatement policy and program. The manual contains a discussion of the entire process of developing a noise abatement program including (1) defining the existing noise situation, (2) determining where this noise situation may conflict with existing or proposed development, (3) developing a program for reducing conflicts, (4) evaluating impact of the program on the community, (5) implementing the program through legislation and action programs. Technical appendices include aircraft EPNL contours, method of finding Noise Exposure Forecast (NEF) level for a given location, analysis of sound insulation, and annotated bibliography.

Beland, RD Mann, PP

Wiley and Ham, Bolt, Beranek and Newman, Incorporated Final Rpt.  
WH-979-1, Nov. 1972, 275 pp

ACKNOWLEDGMENT: Flight Transportation Laboratory, MIT (FTL 3-4 076)  
ORDER FROM: NTIS

PB-213020

03 075504

### AIRPORT NOISE. ITS IMPACT AND ALLEVIATION

Present noise alleviation efforts have not yet brought the type of conclusive action which is needed to significantly reduce exposure to high levels of aircraft noise. The inquiry seeks to outline and define in some specifics a systematic approach to resolving the problem of airport noise. Aircraft noise alleviation measures are evaluated by an analytic scheme involving four variables: effectiveness, scope, cost of implementation, and limitations. The three major categories of alleviation measures are studied: insulation of the receiver, separation of the source and receiver, and reductions at the source. The effectiveness of most measures in reducing noise exposure near airports is poor. Zoning is largely unsuccessful in excluding noise sensitive land uses near airports. Acoustic conditioning of structures is too expensive. The analysis did indicate that three methods are potentially capable of significantly reducing noise exposure: retrofitting present engines with acoustically treated nacelles, re-equipping the existing fleet with high-bypass-ratio engines, and noise abatement operation procedures. Additionally, both STOL and VTOL promise reductions in aircraft noise exposure. An examination of mechanisms for coping with environmental problems--setting standards, subsidies, and taxation or imposition of effluence charges--showed the latter to be potentially most effective.

Carl, R

Massachusetts Institute of Technology PhD Thesis Jan. 1971

ACKNOWLEDGMENT: Flight Transportation Laboratory, MIT (FTL 3-1-101)

03 090347

### AIRPORT NOISE REDUCTION FORECAST. VOLUME I. SUMMARY REPORT FOR 23 AIRPORTS

A detailed analysis of cost effectiveness of two aircraft noise reduction alternatives was carried out and the results are summarized in this report. The alternatives consisted of: two different modifications of civil air carrier aircraft having JT3D or JT8D engines. Both alternatives assumed standard use of a two-segment approach procedure incorporating a glide slope for landing. The analysis specified includes a detailed evaluation of noise impact at 23 airports for the years 1972, 1978, 1981, and 1987 along with a detailed cost analysis of implementing the alternatives.

Prepared in cooperation with Speas (R. Dixon) Associates, Manhasset, N.Y. Paper copy also available in set of 2 reports as PB-239 386-SET, PCS14.00.

Bartel, C Sutherland, LC Simpson, L

Wyle Laboratories, Office of Noise Abatement, Speas (R Dixon) Associates  
Final Rpt. WRC-74-14-1, Oct. 1974, 222p

Contract DOT-OS-20088

ACKNOWLEDGMENT: NTIS  
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PB-239387/4ST

03 090348

### AIRPORT NOISE REDUCTION FORECAST. VOLUME II. NEF COMPUTER PROGRAM DESCRIPTION AND USER'S MANUAL

A fundamental requirement of this effort was that the noise impact of air traffic around major airports on the surrounding community should be described and that predictions of various noise abatement alternatives should be made. For this the DOT/Wyle noise exposure forecast computer program was developed. Volume 2 of the report is a description of this program. Included are brief descriptions of the calculations performed, the subroutines that perform them, and a user's guide. Also included is a complete listing of the program, in FORTRAN V. Inputs to the program are a description of the airport geometry including flight paths, aircraft noise and performance characteristics, and the aircraft fleet mix. Outputs are contours of equal value of Noise Exposure Forecasts around the airport.

Paper copy also available in set of 2 reports as PB-239 386-SET, PCS14.00.

Bartel, C Coughlin, C Moran, J Watkins, L

Wyle Laboratories, Office of Noise Abatement Final Rpt. WRC-74-14-2,  
Oct. 1974, 229p

Contract DOT-OS-20088

ACKNOWLEDGMENT: NTIS  
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PB-239388/2ST

03 091196

### COMMUNITY NOISE EXPOSURE RESULTING FROM AIRCRAFT OPERATIONS: TECHNICAL REVIEW

This report is one of a series describing the research program undertaken by the Aerospace Medical Research Laboratory to develop procedures for predicting the community noise exposure resulting from aircraft operations. It reviews current methods for predicting noise exposure around an airport, the results of various social surveys around airports, and psychoacoustic studies of aircraft noise signals, as well as effects of aircraft performance, flight path dispersion, non-standard weather effects, and other factors affecting the accuracy and variability in predicting aircraft noise exposure on the ground. These reviews and analyses are used to recommend a revised procedure for predicting noise around air bases.

Galloway, WJ

Bolt, Beranek and Newman, Incorporated, Aerospace Medical Research  
Laboratory, (AF-7231) Final Rpt. BBN-2581, Nov. 1974, 235 pp

Contract F33615-73-C-4160

ACKNOWLEDGMENT: NTIS  
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AD/A-004822/3ST

03 091197

### COMMUNITY NOISE EXPOSURE RESULTING FROM AIRCRAFT OPERATIONS: COMPUTER PROGRAM DESCRIPTION

This report describes a computer program to calculate community noise exposure as determined by the Noise Exposure Forecast (NEF) methodology. Studies by the United States Environmental Protection Agency have meanwhile led to the specification of another community noise exposure measure: the Day/Night Average Level (DNL). Since the two types of descriptors are essentially similar, the computer program may be adapted to this new unit when the need arises without the need to redevelop the computational algorithms.

Horonjeff, RD Kandukuri, RR Reddingius, NH

Bolt, Beranek and Newman, Incorporated, Aerospace Medical Research  
Laboratory, (AF-7231) Final Rpt. BBN-2585, Nov. 1974, 118 pp

Contract F33615-73-C-4160

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD/A-004821/5ST

03 091198

**COMMUNITY NOISE EXPOSURE RESULTING FROM AIRCRAFT OPERATIONS: APPLICATION GUIDE FOR PREDICTIVE PROCEDURE**

This report is one of a series describing the research program undertaken by the Aerospace Medical Research Laboratory to develop procedures for predicting the community noise exposure resulting from aircraft operations. It discusses the applications of the procedure to the aircraft noise-related problems facing master planners, civil engineers, environmentalists, etc., as well as the management people concerned with operating an air base. Examples are given of use of the procedure in terms for land planning, operational applications at air bases and basic aircraft design.

Bishop, DE

Bolt, Beranek and Newman, Incorporated, Aerospace Medical Research Laboratory Final Rpt. BBN-2582, Nov. 1974, 111 pp

Contract F33615-73-C-4160

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

AD/A-004818/1ST

03 091352

**NOISE EMISSIONS AND BUILDING STRUCTURAL VIBRATION LEVELS FROM THE SUPERSONIC CONCORDE AND SUBSONIC TURBOJET AIRCRAFT**

Noise emissions and building structural vibration levels were measured during landing and take off operations of the Anglo/French supersonic aircraft (Concorde) and from some conventional subsonic turbojet aircraft. Measurements were made at both the Fairbanks International Airport, Fairbanks, Alaska and at the Logan International Airport, Boston, Massachusetts. This report contains graphic level time history recordings, tabulated peak RMS noise and vibration levels measured, EPNL/PNLT history data, and 1/3 octave frequency spectra of selected events.

Rickley, EJ Quinn, RW Sussan, NR

Transportation Systems Center Final Rpt. DOT-TSC-OST-74-35, Mar. 1975, 260 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-241384/7ST

03 093653

**EMOTIONALITY IN RESPONSE TO AIRCRAFT NOISE: A REPORT OF DEVELOPMENT WORK**

A literature search and pilot study conducted to investigate the topic of emotional response to aircraft noise are described. A Tell-A-Story Technique was developed for use in the pilot study which required respondents to make up stories for a series of aircraft-related and non-aircraft-related pictures. A content analysis of these stories was made. The major finding was that response patterns varied among three groups of respondents—those currently living near airports, those who had lived near airports in the past, and those who had never lived near airports. Negative emotional feelings toward aircraft were greatest among respondents who had lived near airports in the past but no longer did. A possible explanation offered for this finding was that people currently living near airports might adapt to the situation by denying some of their negative feelings, which they might feel more free to express after they had moved away from the situation. Other techniques used in the pilot study are also described, including group interviews and a word association task. (Author)

Klaus, PA

National Bureau of Standards Final Rpt. NASA-CR-2600, Oct. 1975, 90 pp

Contract NASA ORDER L-88318

ACKNOWLEDGMENT: NTIS

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N75-32748/6ST

03 093724

**NOISE AND SPEECH INTERFERENCE: PROCEEDINGS OF MINISYMPOSIUM**

Several papers are presented which deal with the psychophysical effects of interference with speech and listening activities by different forms of noise

masking and filtering. Special attention was given to the annoyance such interruptions cause, particularly that due to aircraft flyover noises. Activities such as telephone listening and television watching were studied. A number of experimental investigations are described and the results are analyzed.

Shepherd, WT

Langley Research Center NASA-TM-X-72696, Sept. 1975, 230 pp

ACKNOWLEDGMENT: NTIS

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N75-31731/3ST

03 093811

**FURTHER STUDIES OF METHODS FOR REDUCING COMMUNITY NOISE AROUND AIRPORTS**

A simplified method of analysis was used in which all flights at a "simulated" airport were assumed to operate from one runway in a single direction. For this simulated airport, contours of noise exposure forecast were obtained and evaluated. A flight schedule of the simulated airport which is representative of the 23 major U. S. airports was used. The effect of banning night-time operations by four-engine, narrow-body aircraft in combination with other noise reduction options was studied. The reductions in noise which would occur of two-and three-engine, narrow-body aircraft equipped with a refanned engine was examined. A detailed comparison of the effects of engine cutback on takeoff versus the effects of retrofitting quiet nacelles for narrow-body aircraft was also examined. A method of presenting the effects of various noise reduction options was treated. (Author)

Petersen, RH Barry, DJ Kline, DM

Neilsen Engineering and Research, Incorporated NASA-CR-137739, May 1975, 275 pp

Contract NAS2-8190

ACKNOWLEDGMENT: NTIS

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N75-30179/6ST

03 093837

**MANEUVERING AIRCRAFT: NOISE POLLUTION AND CONTROL (A BIBLIOGRAPHY WITH ABSTRACTS)**

Methods for alleviating noise created by maneuvering aircraft are analyzed in these Government-sponsored research reports. (Contains 170 abstracts) For aircraft sonic boom see NTIS/PS-75/318, Studies on Flight and Design; NTIS/PS-75/319, Effects on Buildings; and NTIS/PS-75/320, Biological Effects.

Supersedes NTIS/PS-75/060.

Habercom, GEJ

National Technical Information Service Report Oct. 1975, 175 pp

ACKNOWLEDGMENT: NTIS

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NTIS/PS-75/762/5ST

03 094165

**ABSTRACTS OF THE 1971-1974 UNITED STATES AND FOREIGN OPEN LITERATURE ON NOISE. PART II**

This document is a task report of effort directed toward a search of the open literature to provide some insight into the noise reduction effort outside of the Federal Government and in foreign countries. A compilation of the abstracts is presented as an appendix.

See also PB-248 116.

Bergmann, EP Fieldhouse, IB

IIT Research Institute, Environmental Protection Agency IITRI-J6331, EPA/600/2-76/016b, Jan. 1976, 484 pp

Contract EPA-68-01-2234

ACKNOWLEDGMENT: NTIS

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PB-248293/3ST

03 094172

## ABSTRACTS OF THE 1971-1974 UNITED STATES AND FOREIGN OPEN LITERATURE ON NOISE. PART I

This document is a task report of effort directed toward a search of the open literature to provide some insight into the noise reduction effort outside of the Federal Government and in foreign countries. Abstracts from the search covered the period 1971 to 1974. Two primary sources were searched for abstracts: The Engineers Index and Pollution Abstracts. Nearly 1300 abstracts from 21 countries were screened and segregated into the following categories: Aircraft noise; building noise; general interest; machinery noise; noise effects on health; noise measurement instrumentation; and transportation noise. The distribution of abstracts within each technical area is summarized in the report, and a compilation of the abstracts is presented as an appendix and bound separately.

Environmental protection technology series.

Bergmann, EP Fieldhouse, IB

IIT Research Institute, Environmental Protection Agency, (EPA-J-6331)  
EPA/600/2-76/016A, Jan. 1976, 48 pp

Contract EPA-68-01-2234

ACKNOWLEDGMENT: NTIS

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PB-248116/6ST

03 094264

## EFFECTS OF LONG DURATION NOISE EXPOSURE ON HEARING AND HEALTH

Contents: Mode of cochlear damage by excessive noise-an overview; TTS in man from a 24-hour exposure to an octave band of noise centered at 4 KHZ; Protective effects in men of brain cortex gangliosides on the hearing loss induced by high levels of noise; Studies of asymptotic TTS; Asymptotic behavior of temporary threshold shift during exposure to long duration noises; The incidence of temporary and permanent hearing loss among aircrews exposed to long-duration noise in maritime patrol aircraft; Psycho-physical performance of Air Force technicians after long duration noise exposure; The effects of ear protectors on some autonomic responses to aircraft-and impulsive noise; Influence of the noise on catecholamine excretion; Effects of noise exposure; Physiological effects of noise; An investigation of aircraft voice communication systems as sources of insidious long-term acoustic hazards; Physiological responses due to noise in inhabitants around Munich airport.

NATO furnished.

Whitcomb, MA

Advisory Group for Aeronautical Res & Dev-NATO Conf Proc. Nov. 1975, 10 pp

ACKNOWLEDGMENT: NTIS

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AD-A018846/6ST

03 094296

## AN ASSESSMENT OF THE FEDERAL NOISE RESEARCH, DEVELOPMENT AND DEMONSTRATION ACTIVITIES, FY73-FY75

The Federal noise research, development, and demonstration (RD&D) activities during fiscal years 1973 through 1975 are examined to determine the contribution of these efforts to the control of environmental noise and to the understanding of the effects of noise. An analysis is made of the research activities in the areas of noise effects, aircraft noise, surface vehicle noise, and machinery noise. The principal sources of information used are the EPA interagency noise research panels reports on the Federal noise RD&D activities during the FY 73-75 time period and the major noise source candidates which have been identified or are under consideration by the EPA. Federal noise RD&D activities are identified which have supported the development and enforcement of existing or proposed standards and regulations and/or could support future standards and regulations, particularly for the EPA major noise source candidates. Federal research activities which could identify the limits to noise control technology are also identified. Specific and general conclusions are made concerning the adequacy of the current Federal noise RD&D activities to support EPA regulatory activities.

Berkau, EE Cordle, SR Hart, FD Simon, GR

Motor Carrier Lawyers Association Final Rpt. EPA/600/2-75/101, June 1975, 134 pp

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-246894/OST

03 094469

## ESTABLISHING NOISE CRITERIA FOR RESIDENTIAL LIVING IN AREAS SURROUNDING COMMERCIAL AVIATION AIRPORTS

This study provides results that contribute to establishment of airport noise levels that are compatible with residential living activities. Community noise simulation systems were placed in the homes of twenty-four families that were not impacted by actual airport noise. Four different airport noise conditions were simulated. Three conditions involved day flights of 150 aircraft with average Noise Exposure Forecast (NEF) values of 36.9, 32.5, and 26.9. The fourth condition added 18 night flights (10:00 PM to 7:00 AM) which resulted in a mean NEF of 32.9. Interference with daily living activities and annoyance responses to the four conditions were obtained. Some of the results and conclusions are presented.

Man-Acoustics and Noise, Incorporated, Federal Aviation Administration  
Final Rpt. FAA-RD-75-211, MAN-1011, Dec. 1975, 73 pp

Contract DOT-FA74WAI-439

ACKNOWLEDGMENT: NTIS

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AD-A021683/8ST

03 094574

## REVIEW OF STUDIES INVESTIGATING HUMAN RESPONSE TO COMMERCIAL AIRCRAFT NOISE

The report reviews empirical studies involving human response to commercial aircraft/airport noise. The review was limited to studies that involved response to actual or recorded flyover signals of conventional takeoff and landing (CTOL) aircraft. Study summaries are provided for the studies reviewed. These summaries included study aim, number of subjects, type of aircraft signals, and results. Study methods identified were laboratory, field studies, social survey approach, complaint studies, damage risk, interference type studies, and combination methods. Laboratory methods have dominated research work in this area and with the exception of the social survey and complaint methods, emphasis has been on response to individual flyover events. A few recent studies have studied response to number of events over time, particularly interference type studies. Research needs are identified emphasizing the more realistic methods which investigate human response to multiple events over time.

Man-Acoustics and Noise, Incorporated, Federal Aviation Administration  
Final Rpt. FAA-RD-75-182, MAN-1011B, Nov. 1975, 156 pp

Contract DOT-FA74WAI-439

ACKNOWLEDGMENT: NTIS

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AD-A022356/OST

03 131169

## LEGAL AND ECONOMIC ASPECTS OF ENVIRONMENTAL CONSTRAINTS ON AIRPORT LANDSIDE CAPACITY

This paper focuses on environmental considerations and some ancillary institutional factors arising out of common law rights, major federal legislation, and state legislation. Until recently, landside capacity was not subject to significant environmental constraints. However, the probability of federal funding for heretofore ineligible landside components and the increasing sophistication of environmental analysis suggest that landside capacity will be constrained in the future by environmental considerations. Accordingly, this paper reviews the experience of airports under the environmental legislation for the years 1968 to 1974 as an indicator of the nature and dimensions of environmental constraints. In that period, projects or operations at more than 50 airports were delayed, halted, abandoned, or modified as a result of the federal environmental statutes. As an analytical tool, the paper presents a matrix of potential costs associated with the statutes, together with a summary of the limited data on actual costs incurred in that period, both as a result of the statutes and as independent



or voluntary expenditures. Environmental processing and litigation under the National Environmental Policy Act have entailed significant delay to projects, which in turn resulted in substantial cost increases, primarily associated with inflation. Although there is some room for improving the consideration of environmental factors, airport development has become an inherently more complex undertaking. Four phases of the environmental era are delineated, and issues relating to landside capacity are identified for further study. The information from these studies is needed to convert the constraining influence of environmental factors into opportunities for improved decision making. /Author/

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

Kleinfeld, RL (Raytheon Company) *Transportation Research Board Special Reports* No. 159, 1975, pp 156-173, 1 Fig., 5 Tab., 4 Ref.

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03 133135

#### DEVELOPING NOISE EXPOSURE CONTOURS FOR GENERAL AVIATION AIRPORTS

This report describes a procedure for generating noise contours around general aviation airports using three units of noise exposure: composite noise rating (CNR), noise exposure forecast (NEF), and day/night levels (LDN). The procedure is to determine the number of annual operations at an airport, and to apply a weighting to this number to account for such effects as multi-engine and nighttime operations; propeller and jet operations are considered separately. A series of noise contour maps are provided in the report for a wide range of numbers of annual operations, based on standard flight tracks. The appropriate maps should be selected (taking account of mixed propeller and jet operations, multiple runway usage, etc.) enlarged and combined by logarithmic addition of noise exposure levels to produce an overall set of noise contours for the airport. (Author)

Bishop, DE Hays, AP  
Bolt, Beranek and Newman, Incorporated Final Rpt. FAA-AS-75-1,  
BBN-2964, Dec. 1975, 203 pp

Contract DOT-FA75WA-3310

ACKNOWLEDGMENT: NTIS

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AD-A023429/4ST

03 136661

#### COMMUNITY NOISE EXPOSURE RESULTING FROM AIRCRAFT OPERATIONS. APPENDIX: NOISEMAP PROGRAM OPERATOR'S MANUAL

This report delineates the program operator changes consistent with the additional developments made on the computer program described in AMRL-TR-73-109 (AD-A004 821). The added capabilities and improved diagnostics that form NOISEMAP 3.2 are discussed. NOISEMAP 3.2 is used Air Force-wide to compute community noise exposure from aircraft flying and ground runup operations for preparing/assessing candidate Environmental Impact Statements and planning compatible land use in the vicinity of air installations. Improvements made to NOISEMAP include: (1) Optional outputs in terms of day-night average sound level, noise exposure forecast, and these measures with tone correction and ground runup penalty weightings; (2) Optional contour plotting on a line printer when sophisticated contour plotting software and hardware are not available; (3) Optional capability to perform the noise exposure computations over limited areas rather than the entire airbase vicinity; (4) Computation of the area contained within specified noise exposure contours; (5) Variable grid spacing of the computations to provide sufficient data points in high gradient noise exposure regions; and (6) Plotting of the aircraft altitude profiles to aid in checking the input operational data.

Appendix to report dated Jul 74, AD-785 360.

Reddingius, NH  
Bolt, Beranek and Newman, Incorporated, (AF-7231) Final Rpt.  
BBN-2946, AMRL-TR-73-108-App, Feb. 1976, 29 pp

Contract F33615-75-C-5044

ACKNOWLEDGMENT: NTIS

34

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AD-A022911/2ST

03 136670

#### LAKE ERIE INTERNATIONAL JETPORT MODEL FEASIBILITY INVESTIGATION. REPORT 17-6. APPLICATION OF THREE-DIMENSIONAL HYDRODYNAMIC MODEL TO STUDY EFFECTS OF PROPOSED JETPORT ISLAND ON THERMOCLINE STRUCTURE IN LAKE ERIE

A previously developed three-dimensional, variable-density hydrodynamic model was applied to the Lake Erie area about Cleveland. This application was to investigate the effect of a proposed jetport island on the summer stratification pattern in the nearshore lake area and on the flushing characteristics of the Cuyahoga River outflow into the lake. Initial results obtained from the application of the model are presented. (Author)

See also Report 17-5, AD-A017 694.

Paul, JF Lick, WJ

Case Western Reserve University Report WES-CR-H-75-1-6, Mar. 1976,  
86 pp

Contract DACW39-74-C-0080

ACKNOWLEDGMENT: NTIS

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AD-A022588/8ST

03 137104

#### ASSESSMENT OF NOISE EXPOSURE PRODUCED BY CHANGE IN APPROACH PROCEDURE AT LOS ANGELES INTERNATIONAL AIRPORT

Modifications of aircraft approach and takeoff procedures can be a relatively inexpensive means for achieving potentially great changes in the noise exposure of communities bordering airports. In 1973, Los Angeles International Airport (LAX) inaugurated a revised approach procedure between 2300 and 0600 hours (weather permitting), taking advantage of the airport's proximity to the ocean and light traffic conditions by routing both inbound as well as outbound flights over the ocean during the late night and early morning hours. At the request of the Environmental Protection Agency, a study was undertaken to observe any changes in noise exposure resulting from the revised procedure. The purpose of this report is to document these changes.

Horonjeff, RD

Bolt, Beranek and Newman, Incorporated, Environmental Protection  
Agency BBN-2590, Sept. 1973, 45 pp

Contract EPA-68-01-1835

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-253317/2ST

03 137194

#### EVALUATION OF METHODS OF REDUCING COMMUNITY NOISE IMPACT AROUND SAN JOSE MUNICIPAL AIRPORT

A computer simulation of San Jose Municipal Airport was made of the airport noise impact on the surrounding communities. Alternate operational procedures, improved technology, and land use conversion were evaluated as methods of reducing noise impact in the airport application to other airport communities similar to San Jose. Two segment approaches and thrust cutbacks on takeoff were found to be very helpful in reducing community noise impact; however, these procedures cannot reduce the noise very near the airport. The introduction of sound absorption material (SAM) was found to reduce noise annoyance by over 25%, and the introduction of refan by over 60%. Replacing the present aircraft by DC-10's was found to reduce the noise problem to very small proportions, and the introduction of an advanced technology twin was found to essentially eliminate the noise problem. (Author)

Glick, JM Shevell, RS Bowles, JV

Ames Research Center NASA-TM-X-62503, A-6346, Nov. 1975, 61 pp

ACKNOWLEDGMENT: NTIS

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N76-20031/0ST

03 143124

## SENSITIVITY STUDIES OF COMMUNITY-AIRCRAFT NOISE EXPOSURE (NOISEMAP) PREDICTION PROCEDURE

This report describes a preliminary study of the sensitivity of noise exposure contours to various aircraft noise modeling parameters and assumptions. The study is the first step in a continuing technical assessment of the Air Force community-aircraft noise exposure (NOISEMAP) prediction procedure. The results indicate that the addition of a tone correction to the noise measure can result in appreciable increase in noise exposure areas, but the increase is highly dependent on the type of aircraft operations. Computation of contour areas for nine bases with and without the ground runup penalty showed how the percent of area impacted increased with increasing noise exposure level. Use of alternate algorithms for ground-to-ground propagation and transitions for air-to-ground and ground-to-ground situations is discussed.

See also report dated Aug 75, AD-A017 741.

Bishop, DE Dunderdale, TC Horonjeff, RD Mills, JF Bolt, Beranek and Newman, Incorporated, Aerospace Medical Research Laboratory, (AF-7231) BBN-2956, AMRL-TR-75-115, Mar. 1976, 123 pp

Contract F33615-75-C-5044

ACKNOWLEDGMENT: NTIS

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AD-A026535/5ST

03 143153

## ASSESSMENT OF NOISE EXPOSURE PRODUCED BY VARIATIONS IN LANDING APPROACH PROCEDURES AT SAN JOSE MUNICIPAL AIRPORT

A series of noise measurements were performed at San Jose Municipal Airport in support of the EPA investigation of the use of aircraft operational procedures as means for noise control. These measurements were made to evaluate the effectiveness of different aircraft approach procedures, as used in normal practice by several different airlines, in reducing noise received on the ground in the vicinity of the airport.

Mills, JF

Bolt, Beranek and Newman, Incorporated, Environmental Protection Agency BBN-2589, Aug. 1973, 55 pp

Contract EPA-68-01-1835

ACKNOWLEDGMENT: NTIS

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PB-253368/5ST

03 143176

## AIRPORT NOISE MONITORING SYSTEMS

The purpose of this study was to select and evaluate the ten most comprehensive aircraft noise measurement systems in the Free World. Five U.S. and five European systems were visited and studied. These were installed by various suppliers in the period 1970-1975. For each system, this report presents a description of remote monitor station equipment, central station equipment, data processing and output, staffing and costs for installation and operation, and associated noise abatement program. There is a wide diversity in utilization of systems having the same basic hardware. Also presented are comparative evaluations of the systems and associated equipment and discussions of the application of monitoring systems to airport noise abatement.

Cooper, BK Edmiston, RD

Tracor, Incorporated Final Rpt. FAA-RD-75-216, TRACOR-T75-AU-9531-U, Nov. 1975, 279 pp

Contract DOT-FA74WA-3539

ACKNOWLEDGMENT: NTIS

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AD-A028511/4ST

03 143345

## REPORT ON AIRCRAFT-AIRPORT NOISE

Contents: Adequacy of Federal Aviation Administration flight and operational noise controls; Adequacy of noise emission standards on new and

existing aircraft; Recommendations on the retrofitting and phaseout of existing aircraft; Implications of identifying and achieving levels of cumulative noise exposure around airports; Additional measures available to airport operators and local governments to control aircraft noise.

Environmental Protection Agency July 1973, 121 pp

ACKNOWLEDGMENT: NTIS

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PB-256388/0ST

03 143814

## AIRPORT NOISE (A BIBLIOGRAPHY WITH ABSTRACTS)

Aircraft created noise, noise intensity, noise exposure, and physiological effects, all in airport environments, are investigated in these research reports. (This updated bibliography contains 172 abstracts, 34 of which are new entries to the previous edition.)

Supersedes NTIS/PS-75/530.

Habercom, GEJ

National Technical Information Service Report Aug. 1976, 177 pp

ACKNOWLEDGMENT: NTIS

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NTIS/PS-76/0625/4ST

03 143952

## AIRPORT VICINITY AIR POLLUTION MODEL COMPUTER SOURCE CODE

The Airport Vicinity Air Pollution (AVAP) Model is a Fortran IV computer source program. The AVAP model is a comprehensive airport simulation model which can serve as a tool in evaluating the total air quality impact of all airport operations on the airport vicinity. The model evaluates aircraft, airport non-aircraft, and environs sources and computes pollution concentrations due to each. Input is required for airport configuration, aircraft and ground vehicle operation, fixed sources, and meteorology. Also listed is a copy of an input data set for Washington National Airport. ...Software Description: The program is written in the FORTRAN IV programming language for implementation on an IBM 360/195 computer using the OS version, HASP level operating system. 340K bytes of core storage are required to operate the model.

Source tape is in EBCDIC character set. Tape can be prepared in most standard 7 or 9 track recording modes for one-half inch tape. Identify recording mode desired by specifying character set, tract, density, and parity. Call NTIS Computer Products if you have questions. Price includes documentation, AD-A020 352. Also available as Punched Cards (3753 Cards). (No copies furnished by DDC).

Tigue, J

Federal Aviation Administration FAA/DF-76/001, Dec. 1975

ACKNOWLEDGMENT: NTIS

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AD-A031027/6ST

03 144322

## USER MANUAL: INTERIM PROCEDURE FOR PLANNING ROTARY-WING AIRCRAFT TRAFFIC PATTERNS AND SITING NOISE-SENSITIVE LAND USES

This report presents (1) interim procedures for determining the location of rotary-wing aircraft traffic patterns and ingress and egress corridors into an airfield/heliport area to avoid conflict with noise-sensitive land uses, and (2) criteria for siting noise-sensitive land uses with respect to establish airfield or heliport palms. The procedures are based on interim criteria established in a companion report. Technical Background: Interim Criteria for Planning Rotary-Wing Aircraft Traffic Patterns and Siting Noise-Sensitive Land Uses (Construction Engineering Research Laboratory Interim Report N-9, 1976). The presentation of the procedures includes a history of noise impact measures, a background of the development of noise contours, and tables for finding the noise impact. A complete descriptive example of the use of the procedures is presented as an aid to the reader. /Author/

Schomer, PD Homans, BL

Army Construction Engineering Research Laboratory Intrm Rpt. N-10, Sept. 1976, 38 pp, 19 Ref., 8 Tab., 1 App.

ACKNOWLEDGMENT: Army Construction Engineering Research Laboratory

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03 144429

**A MODEL FOR THE PREDICTION OF NOISE LEVELS ARISING FROM TYPICAL AIRPORT OPERATIONS**

A noise exposure prediction method has been developed for airport noise, that requires a minimum of information on aircraft movements. A standard case has been defined which relates to a fully developed regional airport and noise contours are presented. In order to make comparison, and combination, with noise from other sources possible, the noise exposure is calculated in mean energy level units as well as the conventional noise and number index. The new U.S. unified unit, the day/night mean energy level is also computed in an approximate manner. The resulting noise contours are found to extend over considerably greater areas than those defined in the U.S. Housing and Urban Development guidelines, casting doubt on the guidelines usefulness as a planning tool.

Hirji, FKI Waters, DM

Loughborough University of Technology, England Rpt. No. TT 7511, July 1975, 116 pp, 13 Fig., 16 Tab., 24 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-222148)

ORDER FROM: Loughborough University of Technology, England, Loughborough LE113TU, Leicestershire, England

7601057

03 145844

**A STUDY OF MONITORING REQUIRED IN REGULATION OF AIRPORT NOISE. VOLUME II**

The volume relates to the reporting of current basic characteristics, mode of application, and effectiveness of airport noise monitoring systems in operation at airports in the United States and abroad. Background information is presented concerning proposed airport noise regulations in the United States. Noise monitoring equipment and procedures are discussed.

Hydrospace-Challenger, Incorporated, Environmental Protection Agency Sept. 1974, 314 pp

Contract EPA-68-01-2686

ACKNOWLEDGMENT: NTIS

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PB-258153/6ST

03 154083

**THE SUBJECTIVE EVALUATION OF NOISE FROM LIGHT AIRCRAFT**

A study was conducted in which subjects evaluated the sounds of a light aircraft and a motorcycle. Particular emphasis was placed on examining the duration of the sounds. Thirty subjects gave annoyance ratings to a total of 50 sounds, with peak levels between 65 and 85dB(A). It was found that aircraft and motorcycles have differing optimum duration corrections. The conventional duration correction used in the calculation of E<sub>PNL</sub> is far from being the optimum for light aircraft.

Shepherd, KP

Utah University Final Rpt. NASA-CR-2773, UTEC-ME-75-159, Dec. 1976, 39 pp

Grant NSG-1160

ACKNOWLEDGMENT: NTIS

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N77-14615/7ST

03 154319

**DEVELOPMENT OF A UNIFORM APPROACH TO CHARACTERIZE NOISE IMPACT ON PEOPLE**

Effective planning requires valid characterization and prediction of the noise environment, an understanding of the origin of the noise and the contribution of various sources, and the legal power to control noise generation and enforce landing-use planning. As a matter of fact, some of the tremendous progress made in producing the new, quieter generation commercial jet aircraft, such as the DC10 or L1011, is almost in vain unless proper land-use planning around airports prevents further encroachment of residential areas on the airport. A noise control program which does not address all phases of the total system-noise sources, transmission path to the receiver, and the receiver of the noise; i.e., the communities and the people in them-must remain effective.

36

Presented at Annual Aerospace Medical Association Meeting (46th) held in San Francisco, Calif., 27 Apr-2 May 75. Availability: Pub. in Aviation, Space and Environmental Medicine, p45-53 Jan 76.

von Gierke, HE

Aerospace Medical Research Laboratory, (7231) Preprint AMRL-TR-75-40, 1976, 10 pp

ACKNOWLEDGMENT: NTIS

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AD-A036224/4ST

03 154396

**ENVIRONMENTAL NOISE ASSESSMENT, LAWTON, OKLAHOMA**

Using a simple methodology employing inexpensive equipment as described in this report, Lawton, Oklahoma, assessed environmental noise levels in their community during the summer of 1975. They measured equivalent sound levels at eleven sites within the city and identified major sources of noise. The results showed only two areas in Lawton with probable adverse noise impacts, both in the vicinity of local airfields. Small aircraft, automobiles, and helicopters were the most prevalent sources of intrusive environmental noises. Jet aircraft were the most intense.

See also report dated 4 Apr 74, PB-239 120.

LaBrecht, RM Mendias, ML

Lawton Metropolitan Area Planning Commission, Environmental Protection Agency Final Rpt. EPA/906/9-76/002, Apr. 1976, 167 pp

ACKNOWLEDGMENT: NTIS

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PB-263135/6ST

03 154741

**FAA INTEGRATED NOISE MODEL USER'S GUIDE**

The FAA Integrated Noise Model (INM) provides a conceptually simple method for characterizing aircraft noise near airports. It includes a determination of the total time that the sound level exceeds six different thresholds, and also the equivalent A-weighted sound level, L<sub>sub eq</sub>, and the day-night average sound level, L<sub>sub dn</sub>, at a number of points surrounding a particular airport. Evening and nighttime exposures are broken out separately. Thus, several methodologies are integrated into a single model which provides a very complete picture of the noise environment. The computer program INMPROG is available to calculate all of the above information and to present it in tabular form. Plotter output is also generated, for contours of equal exposures to levels above 85 dBA. Equal L<sub>sub dn</sub> contours may be produced instead, at the user's option. This manual is intended to guide the user of the model through the preparation of data required by this program. A description of the airport and its operations must be assembled onto data forms. A separate chapter specifies the punched card formats, so that the punching of cards is distinct from the collection of data. Technical appendices provide the information required for a computer center to bring up and run the program. (Author)

Mansbach, PA Maginnis, FX

Mitre Corporation FAA-EQ-76-2, MTR-7184, Mar. 1976, 105 pp

Contract DOT-FA69NS-162

ACKNOWLEDGMENT: NTIS

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AD-A035062/9ST

03 155462

**A PROPOSED SYSTEM FOR AVIATION NOISE MEASUREMENT AND CONTROL**

This report reviews previous work on various measures for aviation noise, and proposes a completely new system for aviation noise measurement and control compatible with real time, operational noise monitoring hardware. This new system allows new methods of control and regulation to be introduced, and is designed to cover problems arising from future CTOL, RTOL, STOL, and VTOL aviation systems operating from current airports as well as new urban sites. New measures are proposed for aircraft flyover noise, airport noise exposure, and community noise impact.

Simpson, RW Hays, AP

Massachusetts Institute of Technology FTL Report R73-2, Jan. 1973, 66 pp



ACKNOWLEDGMENT: Massachusetts Institute of Technology

03 155501

## COMMUNITY REACTION TO AIRCRAFT NOISE AROUND SMALLER CITY AIRPORTS

This report presents the results of a study of community reaction to jet aircraft noise in the vicinity of airports in Chattanooga, Tennessee, and Reno, Nevada. These cities were surveyed in order to obtain data for comparison with that obtained in larger cities during a previous study. (The cities studied earlier were Boston, Chicago, Dallas, Denver, Los Angeles, Miami, and New York.) The purpose of the present effort was to observe the relative reaction under conditions of lower noise exposure and in less highly urbanized areas, and to test the previously developed predictive equation for annoyance under such circumstances. In Chattanooga and Reno a total of 1,960 personal interviews based upon questionnaires were obtained. Aircraft noise measurements were made concurrently and aircraft operations logs were maintained for several weeks in each city to permit computation of noise exposures. The survey respondents were chosen randomly from various exposure zones.

Conner, WK Patterson, HP  
Tracor, Incorporated NASA CR-2104, Aug. 1972, 187 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

03 155502

## NOISE EXPOSURE FORECAST CONTOURS FOR 1967, 1970 AND 1975 OPERATIONS AT SELECTED AIRPORTS

Noise Exposure Forecast (NEF) contours resulting from 1967, 1970, and 1975 aircraft operations are depicted for 28 airports. Included are contours for large, medium and small commercial airports and general aviation airports. The NEF contours define land areas having different land-use compatibility with respect to aircraft noise; hence, the NEF areas may be used as a guide to land-use planning and zoning and airport development. The NEF contours are based upon the aircraft noise described in terms of effective perceived noise levels (which includes corrections for duration and presence of discrete frequencies) plus adjustments for the number of operations for daytime and nighttime periods. A description of the digital computer program, tradeoff studies, and evaluation and interpretations for noise exposure forecasts can be found in the following reports prepared in performance of Contract FA68WA-1900: FAA-NO-69-2, FAA-NO-70-6, FAA-NO-70-7, and FAA-NO-70-9.

Bishop, DE Simpson, MA  
Bolt, Beranek and Newman, Incorporated FAA-NO-70-8, Sept. 1970, 267 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

03 155507

## COMMUNITY REACTION TO AIRPORT NOISE. 2 VOLUMES

This report describes a study of the relationships of large numbers of variables--physical, psychological, and social--with community reaction to the noise of aircraft around international airports in large American cities. The seven major airports involved were Logan International-Boston, O'Hare International-Chicago, Dallas International-Dallas, Stapleton International-Denver, Los Angeles International-Los Angeles, Miami International-Miami, and Kennedy International-New York.

Tracor, Incorporated T-70-AU-7454, July 1971, 97 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

03 155511

## AIRPORT NOISE--THE UNANSWERED QUESTIONS

Four major issues of the airport noise problem are discussed in this paper: How much noise reduction should be required? How much will it cost? Who should pay? What method should be used to decide these questions?

From Airport Economic Planning by G.P. Howard.

Franklin Pierce Law Center  
Massachusetts Institute of Technology Press 1974, pp 596-613

ACKNOWLEDGMENT: Massachusetts Institute of Technology

03 155512

## AIRPORT NOISE CONTROVERSY

The questions of airport noise control, the withdrawal of certain aircraft, and the refitting of aircraft were discussed, and comments were made on airport design with an integrated movement system, and the airport certification required for commercial airports. It was proposed that the task of noise control be transferred to the Environmental Protection Agency. It was noted that it is technically feasible to convert the older engines so that they would be only half as noisy as they are today. About \$35 million dollars would be needed to complete the research and development. The advantages of decentralized handling combined with centralization in the secondary area are pointed out. Hanover Airport was used as an illustrative example of such design. Financial planning and the operation of V/STOL operations were also discussed.

Airport Forum Vol. 1 No. 4, Dec. 1971, pp 89-91

ACKNOWLEDGMENT: Massachusetts Institute of Technology

03 155518

## THE COST OF AIRPORT NOISE

The model to estimate the cost of aircraft noise devised for the Roskill Commission on the Third London Airport is explained and discussed. The treatment used by the commission for different activities affected by noise was based on the principle of trying to forecast how the activity in question would react to the impact of noise. A first step in the costing noise nuisance model is to determine the smallest amount the government would have to pay to each householder to willingly accept the noise nuisance. Details of the model operation are discussed and illustrated by a diagram. Problems in arriving at values to use in the model are discussed. Residential noise costs for Nuthampstead (72 million pounds sterling) and the three other sites are discussed. These noise costs are important in distinguishing between alternative London Airport sites.

Flowerdew, ADJ (London School of Economics and Political Science)  
Statistician Vol. 21 No. 1, Mar. 1972, pp 31-46, 2 Fig., 10 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

03 155519

## MEASURING THE COST OF AIRPORT NOISE: FORMULAS AND PITFALLS

A convenient formula for evaluating the depreciation of real property located near an airport is presented. Its legal ramifications are discussed and two court decisions are cited as examples of the use of "factor formula". A District Court field that seven areas of property near the New Haven Airport were entitled to \$18,400 using a modification of the "factor formula" to calculate the damages. On closer inspection the "factor formula for valuation of aviation easements" appears to have several weaknesses, at least one of which was made weaker in the variation used by the court in the New Haven decision, East Haven v. Eastern. Given the rapidly growing legal and public pressures on airports to compensate their neighbors for the annoyance caused by aircraft noise, both the formula and the use of such of such a formula deserve careful study.

Spaeth, RL (St John's College) Appraisal Journal Vol. 40 No. 3, July 1972, pp 412-419

ACKNOWLEDGMENT: Massachusetts Institute of Technology

03 155520

## THE EFFECT ON VALUE OF NOISE FACTORS

Studies on the costs of soundproofing of existing structures and new structures, soundproofing requirements for new buildings, and the reaction of property owners are discussed with reference to example cases. Comments are made on the significance of sound levels, and it is observed that if land development cost does not decrease in proportion to the density loss, the offset must occur in either decreased net to land or lowered profit ratios. The most rapid analysis of these perimeters is obtained via the computer, which is the most satisfactory tool provided that the program has the required flexibility. In the area of government controls, appraisers should be cautious in accepting local agency officials opinions regarding the amount of control they can exercise. The fact that a property or areas is situated near a noise source is not prima facie evidence of loss in value, and the appraiser will have to find valid methods of accurately measuring value loss. Particular attention should be given to the ambient noise levels in affected areas since response

to aircraft or any noise source may be effectively diluted when people are generally used to unusually high noise levels. Similar close examination of sales data is required in most appraisals.

Ingram, D (Ingram (David), Incorporated) *Appraisal Journal* Vol. 40 No. 3, July 1972, pp 420-424

ACKNOWLEDGMENT: Massachusetts Institute of Technology

### 03 155521

#### AIRCRAFT NOISE AND THE SELECTION OF AIRPORT SITES

This article discusses the present crisis facing the aviation industry. The author states that the expansion of air commerce is essential in order to provide society with economic gains and cultural benefits. By 1980, it is expected that sixty-two new air carrier airports will be required to meet the forecasted increase in demand. However, aircraft noise, coupled with the public's increasing concern with the environment and with the quieting of life has brought about increasing resistance to aircraft generations. The author suggests that for many years the legal issue which prevailed was not the level of aircraft noise but rather the applicability of aircraft flight to common law which stated that he who owns the land owns it to the end of the universe. Although the Supreme Court rejected that rule, it did hold that landowners own at least as much of the space above the ground as he can occupy or use in connection with the land. The second important legal issue was where monetary liability was to be placed assuring that flights over private property were so low and so frequent as to be a direct and immediate interference with the enjoyment and use of the land. The question of liability was settled by the Supreme Court in *Griggs v Allegheny County*. The Court held that the airport operator was liable for whatever air easements are necessary for aircraft to use in the course of landing at and taking off from its runways. It remains to be seen how the courts will interpret the Supreme Court's decision in *Griggs* in view of the reasonable balance required between communities affected by aircraft noise and aircraft site selection, and the continuing need for new air carrier airports to meet the expected growth of aviation.

Goldstein, S (Port Authority of New York and New Jersey) *Urban Lawyer* Vol. 4 No. 3, June 1972, pp 548-556

ACKNOWLEDGMENT: Massachusetts Institute of Technology

### 03 155522

#### REPORT ON ENVIRONMENTAL IMPACT OF AIRPORT DEVELOPMENT

This report is a review of the different options open to OECD Member governments to deal with the environmental problems raised by the location and development of major airports. The options identified in this report are based on an analysis of the most recent practical experience in 16 Member countries currently concerned with planning new, or expanding existing major airports. In addition the report puts forward a number of principles which should be given important consideration in airport planning. It suggests that these principles should be adopted in order that the planning process may become more sensitive to environmental concerns than is possible with conventional benefit/cost analysis.

Organization for Economic Cooperation and Development 1974, 18 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

### 03 155524

#### YOU KNOW I CAN'T HEAR YOU WHEN THE PLANES ARE FLYING

This article attempts to clarify why the jet noise problem exists and present some views from the perspective of those who find themselves living in the vicinity of airports. The question addressed in this article is whether the type of progress will be paid by those who benefit from the system, or by the airport neighbors.

Berger, MM *Urban Lawyer* Vol. 4 No. 1, 1972, p 1-32

ACKNOWLEDGMENT: Massachusetts Institute of Technology

### 03 155550

#### THE POLITICS OF AIRPORT NOISE

The purpose of this paper is to analyze the difficulties facing an intense minority group which is attempting to change public policy: those persons

who have reacted to the growing intrusion of jet noise into their lives from 1958 on. Chapter 1 recounts the general history of noise as a growing environmental pollutant. Certain questions are posed at the outset: Why is noise being increasingly defined as a public policy problem today? How recently has there been sizable organized reaction to it? Are noise levels in fact increasing, or are we simply "changing our expectations" about the quality of our environment? Chapter 2 focuses specifically on jet aircraft noise abatement. It raises a second set of questions: How has aviation noise emerged as a public problem? Is jet noise any more irritating than other noises? Is aviation noise increasing in exposure and intensity? Is adverse reaction to such noise increasing or decreasing? Chapters 3 through 7 analyze the perceptions and behavior of actors in five main arenas where protests are lodged: the aviation industry (airport operators, aircraft builders, pilots); state and local government; the court system; the federal legislature; and the federal administration. Similar questions are asked in each of these chapters: Why do airport neighbors look to these areas for redress? How have the actors in each area responded? How does each actor perceive his own role and function? How does each feel constrained? How likely is it that focusing efforts on any of them will result in adequate alleviation of noise-impact?

Stevenson, GM

Duxbury Press 1972, 148 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

### 03 155553

#### AIRPORT NOISE CONTROL-CAN COMMUNITIES LIVE WITHOUT IT? CAN AIRLINES LIVE WITH IT?

The impact of aircraft noise on communities surrounding airports is a matter of local and national concern. After reviewing conflicting views concerning the proper solution to the noise problem, it is argued that application of present technology can drastically reduce the detrimental impact of aircraft noise, while striking a balance between the interests of the community and the air industry. To achieve this solution, the necessity of uniting the disciplines of law, science, politics and economics into a singular effort is noted. A unique proposal by creating federal standards of allowable noise impact levels, or "airport noise classes," is presented. In addition, this proposed enables local communities to participate by selecting the class of noise of the particular airport; thus there is the flexibility and balance between local and national interests that is essential if present technology is to be utilized in a politically acceptable and economically feasible system of airport noise reduction.

Vittek, JF (Franklin Pierce Law Center) *Journal of Air Law and Commerce* Vol. 38 No. 4, Sept. 1972, pp 473-518

ACKNOWLEDGMENT: Massachusetts Institute of Technology

### 03 155557

#### SOCIAL ACCEPTABILITY OF HELIPORTS PARTICULARLY FROM THE STANDPOINT OF NOISE

This paper reviews the work and considerations related to the use of helicopters in London, U.K. A systematic survey was undertaken of 44 square miles in Central London. the noise levels (dBA) which are found with various types of road and area at different periods of the day are summarized in tables, and some recommendations for indoor noise standards for dwellings and other types of buildings are tabulated. The Battersea Heliport is discussed, and comments are made on the noise level of individual helicopters, and the assessment of noise level acceptability. the opinion is expressed that decisions to designate sites for future development as terminals for large helicopters and potential STOL or VTOL aircraft should be made as soon as possible in order that compatible land-use zoning can be achieved in their vicinity.

Stephenson, RJ (Greater London Council) *Aeronautical Journal* Vol. 77 No. 749, May 1973, pp 217-220

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

### 03 155568

#### AIRPORT IN A GARDEN

The special features are described of the Norfolk regional airport which is designed for compatibility with the adjoining botanical garden. A huge earth berm built along the perimeter of the airport separates it from the gardens.



It is being thickly planted with trees and bushes to shield the gardens from airport sights and sounds. Suitable exterior and interior finishes are used to blend the airport into the surrounding woodlands. The concealing of parking lots, the individual adjustment of loudspeakers, public waiting lobbies, and the access road system which reduces surface traffic congestion are described.

*Airport World* Vol. 7 No. 2, Feb. 1974, pp 43-44

ACKNOWLEDGMENT: Federal Aviation Administration Library

03 155589

## AIRCRAFT NOISE: REVIEW OF AIRCRAFT DEPARTURE ROUTING POLICY: REPORT

This report which examines the evidence available on the policy of minimum noise routing, gives detailed conditional to feasible alternative policies. The report also attempts to indicate the level of aircraft noise which people could not reasonably be expected to tolerate. Recent reference on the Burnham and Mole Valley departure routes from Heathrow Airport is discussed.

Her Majesty's Stationery Office 1974, 29 pp

03 155605

## SPECULATIONS ON AIR SAFETY AND THE AIRPORT

The importance of community reaction to air safety is discussed, and the need is indicated for relieving public anxiety concerning noise, visible pollution and the fear of airplane crashes in the vicinity of airports. Statistics related to air traffic accidents are discussed, and the desirability of zoning of the land around an airport to alleviate public resistance is suggested.

Lederer, J *Journal of Air Traffic Control* Vol. 16 No. 4, July 1974, pp 25-29

ACKNOWLEDGMENT: Federal Aviation Administration Library

03 155607

## CERTAIN LEGAL ASPECTS OF REQUIRED SOUNDPROOFING IN HIGH NOISE AREAS NEAR JOHN F. KENNEDY INTERNATIONAL AIRPORT IN NEW YORK

The compulsory soundproofing proposals with respect to new and existing structures. This study is made primarily in light of Federal and New York state constitutional provisions and certain state and local legislation. The authors conclude that the principal constitutional problems are the scope of the police and spending powers; that extensive compulsory soundproofing requirements, at least in the highest noise areas, affecting such new privately-owned structures as multiple dwellings, schools and hospitals and perhaps private residences, are likely to be upheld, assuming that in other respects the requirements are reasonably drafted; but that such requirements for existing privately-owned structures would be of dubious validity, except perhaps for multiple dwellings, schools and hospitals. The authors conclude that such requirements could be enacted either by the affected municipalities, if state enabling legislation were made adequate, or by the state legislature in mandatory or optional form; but that at JFK state legislation would appear more promising. Soundproofing of publicly-owned structures and the requirement of soundproofing near airports by the Federal government itself present different problems which are not within the scope of this study and are only mentioned in passing.

Cleary, Gottlieb, Sten & Hamilton 1970, 132 pp

ACKNOWLEDGMENT: Federal Aviation Administration Library

03 155610

## NOISE-REDUCING CONSTRUCTIONS AND COST ESTIMATING IN HIGH NOISE AREAS

The 1975 Noise Exposure Forecasts (NEF's) Base Line and Quiet Engine Contour maps were examined to obtain octave-band sound-pressure levels on the NEF-30 and-40 contours from which noise reducing structures and cost estimates were developed for existing and new buildings in the B and C zones. The process of computing the sound-pressure levels existing at approximately ground level at one mile intervals (the distance selected to provide sufficient sound-level difference) on the NEF-30 and-40 contours is discussed. The computed maximum octave-band sound-pressure levels on the NEF B and C contours were selected along with suitable interior noise design goals to determine the appropriate sound reducing constructions for various existing and new buildings types in the B and C zones. In addition, cost estimates were derived for these sound reducing constructions and the

cost estimates are discussed and the results summarized. Recommendations for reducing the intruding aircraft noise levels by a system of electronically introducing a suitable interior background noise in the various building types are discussed. Respective cost estimates in incremental cost per square foot are also given for comparison of cost per square foot sound reducing constructions with cost per square foot of an electronic masking system.

Goodfriend-Osteryaard Associates Report No. 2098A, Feb. 1970, 61 pp

ACKNOWLEDGMENT: Federal Aviation Administration Library

03 155612

## AIRCRAFTS AND THE COMMUNITY

Aircraft noise has had an impact on the operations of existing airports and on the development of new airports. Runway restrictions, schedule controls, and changes in flight procedures have been instituted. Adjoining lands in high noise impact areas are being acquired by some airports for compatible land usage. Several major new airports have been delayed because of community concern for noise and other environmental problems. Aircraft noise from flight and, in some instances, from ground activity, has been a source of serious complaint to airport management and, in several instances, lawsuits have been filed for damage and injunctive relief. Generally, the same pressures that have been focused on airport management also have been directed at the airlines. In response, many airlines have changed approach, departure, and maintenance procedures which for the most part result in increased costs of operation. The airlines are being asked to consider retrofitting engine nacelles on existing aircraft with acoustical materials to reduce noise at its source. Aircraft and engine manufacturers have performed extensive work to find ways to reduce aircraft noise. This has resulted in a new generation of quieter aircraft. The Federal Aviation Administration (FAA) is developing noise measurement methods and impact area formulas. These methods apparently do not accurately describe the human annoyance factors or clearly delineate the areas of the surrounding community on which airport noise may impact. The foregoing activity will alleviate current noise problems to some extent, but with the anticipated growth in air traffic, both passenger and cargo, longer range fundamental solutions need to be pursued.

National Industrial Pollution Control Council Feb. 1972, 35 pp

ACKNOWLEDGMENT: Federal Aviation Administration Library

03 155616

## METROPOLITAN AIRCRAFT NOISE ABATEMENT POLICY STUDY, O'HARE INTERNATIONAL AIRPORT, CHICAGO, ILLINOIS

At Chicago's O'Hare two runways built since 1965 will enlarge the noise-impacted area to include the homes of half a million persons by 1975. Land use strategies in this short time can only limit the 58,000 persons which residential construction trends would bring into the noise-impacted area by 1975. Operational changes plus acoustical lining of existing aircraft engine nacelles might reduce the impacted population to 190,000. Operational changes plus new engines of quieter design might cut the impacted population to 140,000--less than half of the 1965 number. Motel builders successfully have limited airport noise by adding 20 to 30 percent to construction costs for soundproofing. These techniques are feasible for new multiple-family dwellings in the moderately noise-impacted area, but not in the heavily noise-impacted area, and not for single-family dwellings. Local building codes legally could require soundproofing performance standards for new rental buildings but not for existing owner-occupied dwellings. One solution for two neighborhoods at the runways' edge might be to remove the dwellings and redevelop the land for commerce and industry. Proposed expansion of the airport grounds will remove some of the most noise-impacted vacant land from the market. So will the proposed Elgin-O'Hare Freeway, and the projected growth of industry and commerce. Thirty-nine million dollars should be spent to acquire six noise-impacted sites for regional open space, including flood reservoirs, golf courses, and cemeteries. Moderately noise-impacted land is also suitable for neighborhood playgrounds and ballparks. A regional airport systems plan should be drawn as the first step toward publishing noise forecast maps for all airports in the eight-county bistate region of northeastern Illinois-northwestern Indiana. Zoning could forestall noise impact problems around any future jetport, if land use controls can be coordinated on a regional basis.

Northeastern Illinois Planning Commission 1971, 118 pp

ACKNOWLEDGMENT: Federal Aviation Administration Library



03 155617

**THE AFFECT OF AIRCRAFT NOISE ON THE VALUE OF RESIDENTIAL PROPERTY NEAR THREE SELECTED AIRPORTS**

The purpose of this paper is to develop some statistical evidence bearing on the hypothesis that the negative effect of aircraft noise on the value of residential properties adjacent to an airport is significant. Once the task of establishing the evidence supporting the particular hypothesis is accomplished, it is hoped that the result would simultaneously contribute to the development of the methods of measuring the damages of noise and other pollutions in general.

Paik, IK (Georgetown University)  
Urban Transportation Center June 1972, 28 pp

ACKNOWLEDGMENT: Federal Aviation Administration Library

03 155618

**AIRPORTS AND THEIR ENVIRONMENT: A GUIDE TO ENVIRONMENTAL PLANNING**

This document is designed to assist and guide airport planners, regional planners, and all other interested parties in identifying and resolving environmental problems associated with airport planning and development. It treats airport environmental planning as an integral part of the comprehensive regional planning process. The development of the material presented herein involved a combination of selected airport case studies, literature review, and intensive discussions and interviews with public and private agency representatives, to identify, elaborate upon, and describe methodologies for measuring relevant airport environmental factors. The complexity and diversity of the subject matter made such an approach desirable, and in execution this approach effectively addressed itself to the problems at hand. Since a major objective is the development of information and references to assist airport planners in effectively integrating environmental planning with airport planning and comprehensive regional planning, a multi-disciplinary approach to the work was utilized. Case studies of six airports were conducted of which three are presented in the Appendix.

CLM/Systems, Incorporated Sept. 1972, 492 pp

ACKNOWLEDGMENT: Federal Aviation Administration Library

03 155644

**AIRCRAFT NOISE CERTIFICATION REQUIREMENT WHICH ENSURE USE OF AVAILABLE NOISE CONTROL TECHNOLOGY**

The results of compliance demonstration test programs for new wide-bodied aircraft powered by high-bypass-ratio engines showed that in some cases the aircraft noise levels were well below those of the requirements. This prompted a number of investigations, both in the US and internationally, to determine the feasibility of modifying the noise certification standards to be more stringent for future aircraft types. These investigations led to the conclusions that modifications were in order, but there has been no general agreement on the specifics of those modifications. It is essential that new noise certification requirements be established to ensure utilization of the best noise reduction features available to a designer to minimize noise disturbance in communities around airports. However, it is just as important that the noise requirements permit orderly development of an efficient air transportation system. These two requirements tend to be in conflict. It is therefore necessary that the noise certification requirements be based on sound technical principles and that all implications of the requirements be thoroughly understood before their adoption. The purpose herein is to suggest an approach which can satisfy the conflicting needs of minimum community noise disturbance and development of an efficient air transportation system.

McPike, AL *Noise Control Engineering* Vol. 7 No. 3, Nov. 1976, pp 122-131

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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03 155659

**NOISE EXPOSURE FORECAST CONTOURS FOR EXPECTED 1985 AND 1990 OPERATIONS AT SEVEN U.S. AIRPORTS**

This report summarizes a study of the probable impact of future supersonic transport (SST) aircraft operations on the noise environment around seven

airports in the United States. The noise environment is depicted in terms of Noise Exposure Forecast (NEF) contours of NEF 30 and 40 values for projected 1985 and 1990 operation at the following seven airports: 1) Anchorage International Airport (ANC), 2) Logan International Airport, Boston (BOS), 3) Honolulu International Airport (HNL), 4) John F. Kennedy International Airport, New York (JFK), 5) Los Angeles International Airport (LAX), 6) Seattle-Tacoma International Airport (SEA), 7) San Francisco International Airport (SFO). Sets of noise contours are given for each airport for the two projections. Additional contours are shown for John F. Kennedy Airport which reflect changes in SST takeoff profiles and the replacement of SST aircraft by equivalent numbers of subsonic aircraft. This report discusses in more detail the calculation procedures, data sources and assumptions, presents the noise contours and the summaries of the areas falling within the NEF 30 and 40 contours. The last section of the report briefly discusses the results of the studies.

Bolt, Beranek and Newman, Incorporated 1971, 87 pp

ACKNOWLEDGMENT: Air Transport Association of America Library  
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03 155668

**WHAT IS WRONG WITH ROSKILL?**

The papers and proceedings of the Commission on the Third London Airport consisted of nine volumes. Volume VII, assessment of short-listed sites, consisted of a cost-benefit assessment of the four alternative sites at Cublington (Buckinghamshire), Northampton (Hertfordshire), Foulness (Essex), and Thurleigh (Bedfordshire). This article, is very critical of the Commission's assessment and doubts whether a third airport is justified. He believes that the disbenefits being intangibles, are grossly undervalued, and that public protest will be increasingly directed against cost-benefit analysis which disregards equity and the "quality of life."

Mishan, EJ *Journal of Transport Economics and Policy* Vol. 4 No. 3, Sept. 1970, pp 221-234

ACKNOWLEDGMENT: Massachusetts Institute of Technology

03 155708

**AIR TRANSPORT AND THE ENVIRONMENT**

This paper suggests ways in which the problem of conflict between the environment and the economy may be approached. Emphasis is placed on the need to safeguard the economic stability of the airlines in the interest of providing a public service. The paper traces the development of air transportation in an effort to examine the relationship between the economy and the environment. The pattern of future development is then considered, as well as the question: who are the public? The London area with its impressive industry growth is examined, and it is pointed out how underestimation of traffic growth could lead to saturation at Gatwick airport well in advance of current planning. The importance of price as a factor which controls growth is discussed, and arguments for environmental protection are considered. The trend towards quieter aircraft is reviewed, and a table is used to compare noise from different types of aircraft. It is pointed out that siting of airports in their relationship to existing and projected areas of population is important. The responsibility of planners is discussed, and some solutions (e.g. sterilisation of land immediately below take-off/approach paths to preclude domestic habitation) to airport development problems are noted. Comments are made on the cost of retrofitting existing plans with quieter engines and on the repercussion of uncoordinated measures.

Thomson, A *Chartered Institute of Transport Journal* Vol. 24 No. 10, May 1972, pp 385-397, 8 Fig., 2 Tab.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

03 155722

**ENVIRONMENTAL NOISE LEVELS AND NOISE REDUCTION IN RESIDENTIAL COMMUNITIES EXPOSED TO AIRCRAFT NOISE**

The results are reported of measurements performed with a Bruel and Kjaer Sound Level Meter 2204 and a Nagra 4.2L Tape recorder, and a General Radio 1925 Real-Time 1/3rd Octave Analyzer in the residential communities adjacent to the Ben Gurion International Airport in Israel. The noise measurements were confined to only the take-off operations of aircraft. The residential constructions in the communities are 3-4 apartment buildings.

The ground sideline distance of these buildings to the flight path was approximately 300 m. The measurement site was located approximately 4.5 km from the brake release point on the runway. Figures are presented which illustrate the location of the microphones. The results of noise measurements averaged as per each type of aircraft and then for all types of aircraft are tabulated.

Moses, N Zeitlin, O (Israel Aircraft Industries Limited) *Journal of Sound and Vibration* Vol. 43 No. 3, Dec. 1975, pp 578-580, 6 Fig.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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03 155723

## AIRPORTS, NOISE AND TOWN PLANNING

Airports and airways around airports have until now produced more and more noise affecting people living in the vicinity. In order to solve this problem, or at last relieve the disturbances, airports have been located further and further away from city centres, and aircraft movements around airports have been more and more restricted to narrow airways. I think this way is a cul-de-sac. You cannot go on forever producing more and more noise and moving airports further and further away. Neither can you abandon ever-larger built-up areas because the air traffic development makes them unsuitable for living. And certainly you cannot alter the human way of reacting to stress--what remains is to construct aircraft producing less noise. Around each airport there ought to be established a demarcation boundary outside which air traffic will not be allowed to cause more than clearly defined noise values. If these values were exceeded, traffic has to be cut down or certain types of aircraft have to be prohibited. Airports are likely to have a noticeable effect on the physical structure of a region. Therefore, the location of airports should be determined as a function of the desired regional structure. The following principle for siting an airport can be derived from the experience with Arlanda. If one wants to (a) make the most of the sites with good communication possibilities near an airport; and (b) make full use of the communication system established between the city centre and the airport, the corridor between the two should be developed extensively. But to do so, it is imperative to restrict flight-noise disturbances in this corridor. The best way of achieving this seems to be by placing the runway directions at the airport perpendicular to the direction of the corridor.

Ahlberg, CF *Journal of Sound and Vibration* Vol. 43 No. 2, Nov. 1975, pp 363-374, 6 Fig., 5 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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03 155728

## PUTTING A VALUE ON NOISE

This paper discusses the issues involved in developing a method of measuring the environmental dis-amenity to the locality and makes some suggestions as to how this might be achieved. The historical background is discussed, and the development is described of an index which is fair to both airport operators and the public.

Richards, EJ (Institute of Sound and Vibration Research) *Aeronautical Journal* Vol. 80 No. 785, May 1976, pp 193-204, 18 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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03 155742

## SIMULATION OF THE ENVIRONMENTAL IMPACT OF AN AIRPORT ON THE SURROUNDING AIR QUALITY

It is the purpose of this study to demonstrate the procedure involved in simulating those average and maximum pollutant concentrations at or around an airport which fall under the control of the Clean Air Act. The information is useful, when planning new or expanding existing airports, when estimating the impact of airports on the surrounding air quality, and when assessing the effectiveness of control procedures. Simulation of airport air quality requires the accurate assessment of the temporal and spatial emission patterns. This involves the tabulation of air traffic density by type and engine, make and model of aircraft, and engine mode number; the use of fuel by different aircraft; the pollutant emission rates by engine model and operational mode; the allocation of emissions rates to the respective runways, turn-off points, taxiways, and parking areas, and the time each

aircraft spent in the different operational modes. The resulting emission pattern for the Honolulu International Airport reflections scheduled and unscheduled commercial and military jet and piston aircraft and nonaircraft operations. Using this and the appropriate meteorological information average and maximum surface concentrations were calculated and compared with local ambient air quality standards. The calculation of concentrations is based on a newly developed diffusion model incorporating harmonic mean wind speeds for every degree of wind direction as determined by a Parzen maximum likelihood interpolation technique, and the assumption of log-normal concentration distributions. It is shown that for some pollutants the air quality standards are substantially exceeded, and it is concluded that airports may have a considerable adverse impact on their surrounding air quality.

Daniels, A Bach, W (Hawaii University) *Air Pollution Control Association, Journal of* Vol. 26 No. 4, Apr. 1976, pp 339-344, 4 Fig., 2 Tab., 19 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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03 155743

## THE SOCIAL IMPACT OF AIRCRAFT NOISE

The findings of several surveys of annoyance caused by noise at airports are summarized in this article, together with brief comments on the methods used. Various implications of the criteria proposed are considered, and finally the advantages and shortcomings of the methods described are discussed.

Alexandre, A (Organization for Economic Cooperation and Development) *Transportation Quarterly* Vol. 28 No. 3, July 1974, pp 371-388, 2 Fig., 1 Tab.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

03 155744

## THE AIRPORT AND THE ENVIRONMENT

The subject matter of this paper is the role of the airport in a society which is becoming more concerned each day with protecting its environment. Airports and their value to the community is discussed in the first part of the paper. Here the value of the airport to a geographic area is explored and the economic input of the airport in various communities is reviewed. Secondly, the airport as a community liability is explored. The major emphasis here is the effect of noise pollution on the community. Thirdly, noise reduction efforts are reviewed. Reduction efforts are looked at from a technological, operational and legal aspect. Current airport-community environmental situations are reviewed in the fourth part. Minneapolis, Washington, D.C., Miami, New York, St. Louis, Kansas City and Dallas-Forth Worth are cities which are currently involved in airport development. The final part of the paper makes some comments on what can be done to help commuters enjoy the benefits of an airport and at the same time not see a vast amount of environmental destruction.

Lynagh, PM (Maryland University, College Park) *EKPC* Vol. 7 No. 1, Apr. 1973, pp 53-66, 3 Tab., 44 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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03 155766

## MAGNITUDE OF THE AIRPORT NOISE PROBLEM IN THE UK--AN APPLICATION OF THE NOISE BURDEN FACTOR

By using as an example the results obtained from the impact analysis of 11 airport noise environments in the UK (for peak period operations in 1972/3), a comparative assessment of each airports' relative good neighborliness is made using the concept of a noise burden factor. The underlying notions of equity implied (disbenefit/benefit ratio) and the importance of a critical threshold Noise and Number Index level below which any community annoyance is discounted are discussed in the light of any potential for further airport development. The results provide a good estimate of the magnitude of community annoyance due to air transport in the UK.

Inter-noise 76, Proceedings of the International Conference on Noise Control Engineering, Washington D.C.

Deva-Aditya, NJ (Greater London Council) Ollerhead, JB (Loughborough University of Technology, England) Institute of Noise Control Engineering Proceeding 1976, pp 91-94

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM:

A77-20636

03 155767

**INTER-NOISE 76; PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON NOISE CONTROL ENGINEERING**

The papers deal with recent developments in noise control and techniques for measuring and analyzing noise data. General topics include advanced noise-control techniques, machinery noise reduction at the source, aircraft and airport noise, noise measurement and analysis, reduction of in-plant noise exposure, rail transportation noise, noise control engineering in buildings, materials and products for noise control, traffic noise abatement, community noise, international standards and legislature requirements for noise control, designing and planning for industrial noise control, and effects of noise on the individual and on society. Specific papers discuss real-time signal processing of noise data using cross-properly techniques, applications of coherence-function techniques in noise diagnosis and prediction, noise reduction procedures for centrifugal fans, structural acoustical considerations for aircraft, inlet noise reduction for gas turbine engines, requirements for ground-based forward-speed simulation in aircraft noise research, and effects of aircraft noise around several airports.

Institute of Noise Control Engineering Proceeding 1976, 558 pp

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A77-20629

03 155768

**THE FUTURE TRANSPORTATION NOISE ENVIRONMENT IN THE UNITED KINGDOM**

An investigation is conducted regarding the future trends in aircraft noise. The feelings of people about aircraft noise are examined and a generalized cure of serious noise nuisance is established. Approaches for reducing the noise at the airport are considered, taking into account the cost factors involved. Questions concerned road transport noise are also investigated. It is pointed out that in the case of the existing urban communities approaches for quieting the motor vehicle constitute the only solution of noise annoyance problems.

Richards, EJ (Southampton University, England) *Journal of Sound and Vibration* Vol. 43 No. 2, Nov. 1975, pp 147-155, 13 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

03 155771

**COMMUNITY-AIRCRAFT NOISE EXPOSURE MODELING WITH THE NOISEMAP COMPUTER PROGRAM**

A description is given of the NOISEMAP computer program which is concerned with an evaluation of the noise effects of Air Force operations on the environment. It was found that an algorithm could be devised for the calculation of the noise exposure of an arbitrary flight track. Various stages in the development of the NOISEMAP computer program are discussed. The program produces contour maps as output, on the basis of input data which represent the characteristics of the airfield and its operations.

Presented at a ASA Meeting (90th) San Francisco, California, November 3-7, 1975.

Reddingius, NH (Bolt, Beranek and Newman, Incorporated)  
Acoustical Society of America Proceeding 1975, 6 pp

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-25126

03 155772

**COMMUNITY NOISE CAUSED BY SMALL AIRCRAFT AND NOISE OF SMALL AIRCRAFT IN TAKEOFF CONFIGURATION**

A case study of the clash of an expanding community and the airport is described on the example of a typical growing small community airport. From a compliant study a good criterion for a model quiet light aircraft was derived-it should not produce more than 63 dBA SPL at ground level when

flying over at an altitude of 500 ft. Three quieting procedures were studied: modified operational procedures, engine exhaust silencing, and propeller redesign plus engine gearing. It is found that propeller noise, the dominant portion of the total noise, can be reduced by using lower tip speeds, typically achieved by a slower turning, larger diameter propeller.

Noisexpo 75, National Noise and Vibration Control Conference, 3rd, Atlanta, Georgia.

Campanella, AJ  
NOISEXPO 75 Proceeding 1975, pp 330-334, 9 Ref.

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-10094

03 155773

**A NEW METHOD SUGGESTED FOR ESTIMATING THE PSYCHOLOGICAL EFFECT OF THE AIRCRAFT NOISE AT AN AIRPORT**

No Abstract.

Inter-Noise 75, Proceedings of the International Conference on Noise Control Engineering.

Kondo, S (Hitachi Limited) Hayashi, C (Institute of Statistical Mathematics, Japan) Kodama, H (Japan Women's University, Japan) Tohoku University Proceeding 1975, pp 433-436

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-44589

03 155774

**NOISE PROBLEMS OF GENERAL AVIATION AIRPORTS**

The study described is based on a detailed examination of the noise conditions at eight airports in Massachusetts, known as airports with noise problems. The goals were to define objectively unacceptable levels of aircraft noise and to determine what kinds of airport activity lead to noise problems and also what means could be used to reduce the noise impact of airport operations. It was found that group reactions to noise environments are strongly influenced by their perceptions of the circumstances. For example, communities question the need for extensive touch-and-go training operations and are less tolerant of these operations than they are of normal arrivals and departures. Similarly, communities are mistrustful of activities they do not understand and appear to complain more frequently about a given level of exposure when they felt that they are unable to influence the policy of airport operations.

Inter-Noise 76, Proceedings of the International Conference on Noise Control Engineering.

Harris, AS (Bolt, Beranek and Newman, Incorporated)  
Institute of Noise Control Engineering Proceeding 1976, pp 99-102

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-20639

03 155775

**NOISE ZONING AROUND AIRPORTS IN THE FEDERAL REPUBLIC OF GERMANY ACCORDING TO THE AIR TRAFFIC NOISE ACT**

No Abstract.

Inter-Noise 75, Proceedings of the International Conference on Noise Control Engineering.

Vogel, AO  
Tohoku University Proceeding 1975, pp 151-153

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-44581



03 155776

## OPERATIONAL TECHNIQUES FOR REDUCING NOISE

This paper reviews various operation techniques for reducing noise nuisance. Of these, some have already been implemented and, where there is no associated penalty in terms of operational safety, further improvement can be confidently expected. In other cases, significant cost is involved and it is necessary to demonstrate conclusively that safety standards will not be impaired. The provision of adequate data to demonstrate the safety of these operations and, in some cases, the development of new equipment, means that such techniques can only be introduced, if ever, on a protracted time-scale. Perhaps the most promising technique, which is applicable even to the latest "quiet" aircraft, involves continuous descent from the stack to touchdown. This is already being adopted by many airlines and, together with the proper management of drag which is closely associated with this procedure, could result in some alleviation in the comparatively near future.

From the Challenging Future, Proceedings of the 5th World Airports Conference, Brighton, England, May 5-7, 1976.

Saint John, OB (Civil Aviation Authority, England)  
Institution of Civil Engineers Proceeding 1976, 6 pp

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-46534

03 155777

## OVERVIEW OF NOISE

Aircraft noise pollution is discussed with emphasis on the reactions of individuals and communities, and possible solutions (e.g., relocating airports or relocating people who live near airports) are suggested. The measurement of noise levels is examined, and government (EPA) standards governing noise levels are touched upon.

From the Future of Aeronautical Transportation, Proceedings of the Princeton University Conference.

Eldred, KM (Bolt, Beranek and Newman, Incorporated)  
Princeton University Proceeding 1976, 16 pp

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-45793

03 155778

## AIRPORT NOISE CLASSIFICATION

The use of A-weighted noise spectrum has gained widespread acceptance. The A-weighting produces a measure of the loudness of a sound as opposed to the annoyance measured by PNL (Perceived Noise Level). Following a background information on the acoustical concepts of loudness and noisiness, the paper describes four airport noise classification systems referred to as CNR (Composite Noise Rating), NEF (Noise Exposure Forecast), Ldn (Day-Night Level), and ASDS (Aircraft Sound Description System). The CNR system is based on PNL as the fundamental measure of annoyance, while NEF uses effective PNL as the basic noise unit. The two A-weighted systems, Ldn and ASDS, are developed in an attempt to simplify the concepts involved in noise classification, and yet maintain a reasonably objective and effective system. The salient features of the comparisons made is that there are really only minor differences in these various approaches to airport noise classification. These differences are mainly the result of rather arbitrary determination of the relative effect of daytime as compared to nighttime operations.

8th Annual Southeastern Symposium on System Theory, Knoxville, Tennessee, April 26-27, 1976.

Elbert, TF (West Florida University)  
Institute of Electrical and Electronics Engineers Proceeding 1976, pp 320-326, 6 Ref.

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A77-20691

03 155779

## AIRCRAFT OPERATIONAL PROCEDURES FOR COMMUNITY NOISE CONTROL

Noise received at the ground, and particularly noise exposure patterns, may be modified by varying airplane operational procedures. A major improvement in aircraft flyover noise is achieved with the introduction of the wide-bodied transports powered by the new technology high bypass ratio turbofan engines in acoustically treated nacelles. Emphasis is placed on the study of takeoff and approach operational procedures for moderating community noise exposures. An analysis is performed regarding the effect of variations in operational procedures on noise under the flight path as well as regarding the shapes and areas enclosed by noise contour "footprints" in order to evaluate the use of these operational techniques for various noise situations. Of the three takeoff and three approach procedures reviewed, thrust outback on takeoff and two segment approach appear to be most suitable for noise abatement, with delayed transition from approach to landing configuration also indicating some benefit.

Inter-Noise 75, Proceedings of the International Conference on Noise Control Engineering.

Shapiro, N (Lockheed Aircraft Corporation)  
Tohoku University Proceeding 1975, pp 139-145, 7 Ref.

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-44570

03 155780

## AIRCRAFT NOISE--A GOVERNMENT POINT OF VIEW

The goals of the Federal Aviation Administration with respect to aircraft noise are defined and discussed. The FAA's basic program is directed at aircraft noise source control through (1) engineering research and development implemented by type certification regulations, (2) operation and procedure control designed to minimize noise exposure, and (3) exploring means of developing more compatible land usage to obtain environmental harmony between the airport and the surrounding community.

Noise-Con 75, Proceedings of the National Conference on Noise Control Engineering.

Foster, CR  
Institute of Noise Control Engineering Proceeding 1975, pp 141-150

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

76A-10320

03 155781

## AIRCRAFT NOISE AROUND THE BELGRADE AIRPORT

No Abstract.

Inter-Noise 75, Proceedings of the International Conference on Noise control Engineering.

Pravica, P  
Institute of Noise Control Engineering Proceeding 1976, pp 95-98

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

77A-20638

03 155783

## PLANNING THE AIRPORT ENVIRONS PROJECT ORGANIZATION AND MANAGEMENT-THE SEA-TAC COMMUNITIES PLAN EXPERIENCE

The organization and management of the Sea-Tac Communities Plan Study, a cooperative program of land and environmental planning involving Sea-Tac International airport and its surrounding communities, are discussed. The three-phase project was designed to identify problems in airport and community design, water quality and drainage, and aircraft noise, collect relevant data, and select appropriate remedial action on the basis of technical feasibility studies and evaluation of community response.

Proceedings of the International Air Transportation Conference, San Francisco, 24-26 March 1975.

Yoshioka, AH (Port of Seattle)  
American Society of Civil Engineers Proceeding pp 163-170

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-10400

## 03 155784

**PREDICTION OF NOISE EXPOSURE AROUND AN AIRBASE**

A simple procedure to predict noise exposure around an airbase is developed by expanding the concepts applied in civil aviation. The data necessary to predict noise exposure are obtained with an accuracy similar to that encountered in civil aviation from a limited sample. The number of operations at an airbase is normalized over a long term of observations, it is therefore possible to evaluate total noise exposure as in civil aviation. For regular operations, the flight profiles and courses can be grouped with some regularity to calculate the number of operations in each group.

Proceeding of the International Conference on Noise Control Engineering, Inter-Noise 75.

Furukawa, S. Sasaki, F. Nishinomiya, G (Japan Broadcasting Corporation)  
Tohoku University Proceeding 1975, pp 163-166

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-44584

## 03 155785

**QUIET, PEOPLE LIVING HERE-A STRATEGY FOR COPING WITH AVIATION NOISE**

Airport noise problems are discussed with attention given to complaints of residents living in residential areas impacted around suburban airports (through the airport may have been built in an originally sparsely inhabited area) and of airport proprietors faced with civil lawsuits by nearby residents and at the same time restricted from taking necessary noise abatement measures while forced to carry legal liabilities. The need to replace or retrofit noisy aircraft is stressed, and the advantages of airports buying up noise buffer zones before a suburban airport area becomes impacted and real estate values rise, are pointed out. Cases where lower noise accompanies more efficient use of fuel are indicated.

Train, RE (Environmental Protection Agency) *Noise Control Engineering*  
Vol. 6 No. 2, Mar. 1976, pp 52-58, 3 Phot.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

## 03 155786

**RECENT PROGRESS IN THE CONTROL OF AIRCRAFT/AIRPORT NOISE FOR COMMUNITY RELIEF**

Aircraft/airport noise and its impact on the residential community surrounding an airport has become one of the most important planning and abatement concerns of airport authorities, airlines, airframe and engine manufacturers, planning commissions, and government agencies. The present study outlines the significant progress made in the technology, methodology, regulations, strategy, and abatement procedures related to aircraft/airport noise. Emphasis is on noise abatement activities for community relief in the Pacific Northwest region of the U.S.A. with comparison to similar approaches used by other agencies.

Proceeding of the International Conference on Noise Control Engineering, Inter-Noise 75.

Jhaveri, AG  
Tohoku University Proceeding 1975, pp 159-162, 10 Ref.

ACKNOWLEDGMENT: International Aerospace Abstract  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-44583

## 03 155787

**AIRPORTS AND COMMUNITY DESIGN CONSIDERATIONS FOR AIRCRAFT NOISE ALLEVIATIONS**

In addition to the primary noise problem created by overflying aircraft, there are other noise problems within the airport and adjacent communities due to aircraft ground operations and maneuver prior to take-off and after touch-down. The present discussion concerns the noise characteristics of such ground operations as taxiing and holding, engine run-ups, and auxiliary power unit operation during cargo and passenger handling. Attention is given to take-off roll and loss of ground effects of lift-off. The methods of noise control discussed include also the special noise problems created due to thrust reversal operations after touch-down, together with the variation in noise levels produced by changes in thrust levels, particularly apparent during automatic landing.

The Challenging Future, Proceedings, of the 5th World Airports conference, 5-7 May 1976.

Large, JB (Southampton University, England)  
Institution of Civil Engineers Proceeding 1976, 10 pp, 10 Ref.

ACKNOWLEDGMENT: International Aerospace Abstract  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-46535

## 03 155789

**REPORTS OF SLEEP INTERFERENCE AND ANNOYANCE BY AIRCRAFT NOISE**

The paper presents the results of a community noise survey in which 1500 residents living in 11 communities near Kennedy Airport in New York were interviewed with regard to their night, day, and evening annoyance responses to aircraft noise. It was found that, while nighttime operations are only 35% of evening and 48% of daytime activity, the reported mean annoyance during the night is 71% of evening and 90% of the daytime reported annoyance. This suggests that each nighttime flight has the equivalent annoyance effect of 2 day on evening flights. This is compared with the ENR, NEF and Ldn indexes that assume that 10 daytime flights are the equivalent of one nighttime flyover.

NOISEXPO 75, National Noise and Vibration Control Conference.

Borsky, PN (Columbia University, New York)  
NOISEXPO 75 Proceeding 1975, pp 339-343

ACKNOWLEDGMENT: International Aerospace Abstract  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-10096

## 03 155790

**NOISEXPO 75; NATIONAL NOISE AND VIBRATION CONTROL CONFERENCE, 3RD. PROCEEDINGS OF THE TECHNICAL PROGRAM**

Papers are presented dealing with problems in environmental noise legislation, industrial noise control, community noise programs, and air and surface transportation noise. Some of the topics covered include computer technique for in-plant noise control, a new analog/digital sound level meter, the economics of a meaningful environmental noise impact study, adhesives and sealants for sound control materials, reports of sleep interference and annoyance by aircraft noise, and community involvement in power plant noise abatement.

NOISEXPO 75 Proceeding 1975, 358 pp

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-10091

## 03 155792

**WAYS AND MEANS TO IMPLEMENT AN AIRPORT ENVIRONS AREA PLAN**

The basic makeup of an airport Environs Area Plan to deal with concerns such as the impact of aircraft and terminal operations on air and water quality, community integrity. The interrelationships of such a plan with the airport Master Plan serving as a guideline for development of the airport itself are analyzed. Environs plans in use in areas affected by the Sacramento

Metropolitan, the Kansas City International, and the Sea-Tac International airports provide examples for a discussion of implementation techniques.

Proceedings of the International Air Transportation Conference, San Francisco, 24-26 March 1975.

Doyle, RH (Peat, Marwick, Mitchell and Company)  
American Society of Civil Engineers Proceeding 1975, pp 171-189, 11 Ref.

ACKNOWLEDGMENT: International Aerospace Abstract  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-10401

03 155793

## CHELSEA STOLPORT-THE AIRLINE VIEW

American Airlines 1970 technical feasibility study of a Floating Interim Manhattan STOL port (FIMS) in the Hudson River adjacent to the residential community of Chelsea met with strong, well organized, effective opposition. The nature of these confrontations, the interactions of the principles, and the lessons learned as viewed by the airline are of value to any project where technological implementation is perceived by the public as a threat to their quality of life.

Air Transportation Meeting, New York, 18-20 May 1976.

Ransone, RK (Virginia University)  
Society of Automotive Engineers Proceeding SAE Paper 760523, May 1976, 13 pp, 11 Ref.

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-36598

03 155755

## COMMENTS ON MEASURED JET NOISE COMPARED TO CALIFORNIA NOISE CODES AND HEALTH LIMITS

In December 1971, maximum allowable limits on aircraft noise at California airports became effective in the Public Utilities Code (PUC). Noise-exposure limits are specified in terms of a base parameter, Single Event Noise Exposure Level (SENEL), which is an integration of A-weighted noise level with time. Measurements of conventional jet aircraft landing-noise levels at Los Angeles International Airport were made and compared to the PUC SENEL limits, to the "standard" SENEL values used for mapping community noise exposure zones, and to noise limits for hearing and health conservation. The measurement survey indicated that at INM from landing threshold, the standard SENEL limits were exceeded by 5 to 15 dB 50% of the time, and the California SENEL limits were exceeded about 50% of the time. Data from special flight tests for the FAA indicated that the implied SENEL limits would be violated about 35% of the time. If violators were cited according to the PUC (\$1000 per violation), the resulting fines for landing operations would be about \$200,000 per day, or \$70 million per year, at the Los Angeles International Airport.

Lane, SR (California University, Los Angeles) Vol. 56 No. 6, Dec. 1974, pp 1805-10

ACKNOWLEDGMENT: MIT Barker Engineering Library  
ORDER FROM: ESL

03 155803

## EUROPEAN AIRPORTS PRESSURED BY NOISE PROBLEMS

It is pointed out that a number of commercial airports in Europe appear to be particularly affected by noise problems. The case of a new residential area built in the vicinity of an airport is examined. The situation with respect to some of the most important airports in Europe is discussed, taking into account Stuttgart, Paris, Frankfurt, and London. The airlines' attitude concerning the noise problem is also considered, giving attention to Air France, Swissair, and Lufthansa.

Hohle, K *Interavia* Vol. 30 No. 2, Feb. 1975, pp 171-175, 1 Fig., 2 Phot.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

03 155804

## THE CONTROL OF AIRCRAFT NOISE

The development of noise control is reviewed from the lobed nozzles and tubular jet noise suppressors used for the first family of jet powered aircraft

to acoustic liners, current operational procedures and future technology for diminished aircraft noise. Community response can be related to noise exposure. The characteristics that combine to produce annoyance due to aircraft noise include: fear, susceptibility, distance adaptability, misfeasance-preventability, and physical noise exposure. To increase community acceptance, all of the following features must be considered: noise from the aircraft, aircraft operation, land use planning in the airport neighborhood, and along the incoming the outgoing flight tracks. The noise sources discussed include: jet, turbine, fan and compressor noise; shock wave from the blade tips causing "buzz saw", and the noise caused by the high by-pass ratio engine. Operational procedures aimed at noise reduction, such as two segment approach procedure must take into account a wide margin of safety.

Large, JB (Butterworths & Company, Limited) *Aircraft Engineering* Vol. 97 No. 7, July 1975, 5 pp, 15 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

03 155805

## SCALE MODEL STUDY OF LOS ANGELES INTERNATIONAL AIRPORT

Results of scale-model acoustic tests for investigating the noise reducing capacity of various types of barriers along an airport runway are discussed. Trees, terms, reflecting and absorbing walls of various heights, and houses were modeled in various configurations, while an electric spark was chosen to produce the aircraft model noise. Concrete and earth berms and absorbing walls of equal height were equally effective at noise shielding. Trees planted on top of a berm call make the community noisier than with no berm at all. Barriers were not effective until they exceeded the height of most trees and houses (about 20ft.), while increasing the height of 50 ft. did not significantly increase the effectiveness of the shield.

Cann, RG *ASCE Journal of Transportation Engineering* Vol. 101 No. TE3, Aug. 1975, pp 455-462, 8 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

03 155808

## REDUCING THE IMPACT OF AIRCRAFT NOISE-AN AIRPORT VIEWPOINT

The policy on aircraft noise of the international airport association coordinating council is summarized. The associations viewpoint on noise reduction stresses the following points; a firm schedule for the implementation of a retrofit program; programs for meeting the financial burden of the retrofit program; the retirement of older aircraft as an alternative to retrofit; reinforcement of annex 16 to the convention on civil aviation; the creation of noise zones around airports; and the institution of special night noise abatement procedures.

Proceedings from the Symposium on the Impact of Economics on the Design and Operation of Quieter Aircraft.

Treibel, W (Association of German Airports)  
Royal Aeronautical Society 1975, 12 pp, 6 Ref.

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A75-47282

03 155810

## AUTOMATIC AIRPORT NOISE MONITORING SYSTEM

The acoustical parameters which have to be considered in a noise monitoring system are examined. Individual aircraft operations are characterized by the parameter single event noise exposure level. community exposure is characterized by values of hourly noise level and community noise equivalent level. A general description is given of an aircraft noise monitoring system which was designed and built to performance specifications prepared by the airport engineering department in accordance with state requirements.

Connor, WK Cooper, BK (Tracor, Incorporated) *Noise control Engineering* Vol. 5 No. 1, July 1975, pp 36-40, 7 Fig., 1 Phot., 6 Ref.

ACKNOWLEDGMENT: MIT Barker Engineering Library  
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## 03 155812

**AIRPORT NOISE EXPOSURE ESTIMATION. FINAL REPORT**

Aircraft traffic noise was examined in relation to its predictive estimation. The basic properties of an exposure are shown to be mainly defined by the statistics of near-levels and noise durations. The relationship between these was derived and used to develop a method for the prediction of various noise index quantities such as NNI (Noise Number Index), leq (equivalent continuous energy levels), L sub NP (noise pollution level) L10 (level exceeded for 10%) etc., based on information usually acquired for an NNI assessment. The under leq is shown to be expressible in a form similar to NNI.

Brown, D  
Loughborough University of Technology, England May 1975, 168 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

## 03 155813

**TECHNOLOGY AND POTATOES--THE REGIONAL AIRPORT EXPERIENCE**

The findings of a comparative study of the following six regional airports were presented: Dallas/Fort Worth, Kansas City, Washington, D.C., Montreal, Tampa, and St. Louis. Each case was approached as a unique historical entity, in order to investigate common elements such as the use of predictive models in planning, the role of symbolism to heighten dramatic effects, the roles of community and professional elites, and design flexibility. Some of the factors considered were: site selection, consolidation of airline service, accessibility, land availability and cost, safety, nuisance, and pollution constraints, economic growth, expectation of regional growth, the demand forecasting conundrum, and design decisions. The hypothesis developed include the following: the effect of political, social, and economic conflicts, the stress on large capacity and dramatic, high-technology design, projections of rapid growth to explain the need for large capital outlays.

Starling, JD Brown, J Gerhardt, JM Dominus, MI (Southern Methodist University)  
National Aeronautics and Space Administration NASA-CR-147159,  
May 1976, 155 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

## 03 155814

**LAKE ERIE INTERNATIONAL JETPORT MODEL FEASIBILITY INVESTIGATION. THE WIND-DRIVEN CURRENTS AND CONTAMINANT DISPERSION IN THE NEAR-SHORE OF LARGE LAKES**

The wind-driven circulation and dispersion of contaminants in a near-shore region of Lake Erie have been studied by means of numerical models. The first problem studied was that of the thickness of the coastal boundary layer in a large lake. In this study, the non-linear acceleration and Coriolis force terms were included in the equations of motion. Next, a major study of the steady-state and time-dependent currents in the near-shore Cleveland area of Lake Erie, under present conditions and as modified by large man-made structures or islands, e.g., a jetport in the lake, was made. The effects of (1) a jetport island approximately 6 miles offshore of Cleveland, and (2) a land-fill extension of this island to shore, were examined in detail. The island was found not to affect the flow appreciably while the extension to the shore modified the flow significantly. With some modification, the numerical models developed in this report can be applied to study the near-shore regions of other large lakes and the ocean.

Sheng, YP  
Case Western Reserve University Phd Thesis Report 1705, 220 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

AD-A017694

## 03 155819

**PRELIMINARY DESIGN CHARTS FOR THE ASSESSMENT OF AIRPORT NOISE NUISANCE**

A preliminary design guide to assist planners, or cost benefit studies, in the initial siting of an airport relative to a city center is described. The U.S. Department Housing and Urban Development, the percentage of population

disturbed by aircraft noise, and an analysis of a number of social surveys provided the necessary population behavioral data. A computer program using a grid system assessed the number disturbed in each square and sums to give a total. The relatively crude model smooths out local variations and provides reasonable solutions for two test cases (Luton and Leeds/Bradford). Total numbers disturbed are then presented for the average city of 900,000 population (central density 29,000 per sq mi) for three categories of airport against distance from city center and runway alignment. The influence of variations of city size is also shown.

Hirji, FKI Waters, DM  
Loughborough University of Technology, England Nov. 1974, 115 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

## 03 155820

**TEST PLAN FOR AIRCRAFT RUNUP NOISE PENALTY EVALUATION. FINAL REPORT**

This report outlines a test plan for conducting a social survey to determine whether community response to noise from military aircraft operations differs significantly between noise from flight operations and noise from ground runup (maintenance) operations. The report includes discussion of the methodology and rationale for the survey as well as sample telephone and mail questionnaires.

Fidell, S  
Bolt, Beranek and Newman, Incorporated Mar. 1976, 39 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

AD-A026209

## 03 155827

**AN ANALYSIS OF THE EPNL/NEF AIRPORT NOISE RATING PROCEDURE AND DATA BASE**

Recent measurements of noise levels from commercial jet aircraft in landing approach paths indicate that the standard EPNL data used by FAA and other agencies understate the noise levels and noise impact. Also, the current EPNL calculation procedures contain factors which result in noise values 3 EPNdB less than values obtained starting with the same basic noise signals and using the 1967 EPNL procedure. EPNL and Noise Exposure Forecast (NEF) values are ambiguous in meaning, provide only a relative comparison basis and do not indicate the absolute magnitude of noise intensities and the effects of noise on people.

Transpo L.A., Economic Leverage for Tomorrow. Proceedings of the 4th Annual Symposium.

Lane, SR  
Western Periodicals Company Proceeding 1975, 260-275, 58 Ref.

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-27796

## 03 155829

**A CITIZENS COMPUTER SIMULATION-MODELING THE BENEFITS AND DISBENEFITS OF PROJECTED AIRCRAFT OPERATIONS AND PATTERNS FOR ALTERNATIVE AIRPORT PLANS**

This paper describes a simulation gaming exercise for evaluating alternative airport facility improvements and operational changes as they affect the noise levels on surrounding residential property. The computer-aided model entitled "Airport Plan" is intended to be used as a citizen participation technological vehicle for demonstrating the social, economic, and environmental benefits and drawbacks of alternative plans and how they are distributed over time to the participants involved. [4 pp]

From Modeling and Simulation, Volume 6. Proceedings of the 6th Annual Conference, Pittsburgh, 24-25 April 1975.

Frech, GM  
Instrument Society of America Proceeding 1975

ACKNOWLEDGMENT: International Aerospace Abstracts

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76A-23159

03 155835

## PLANNING THE AIRPORT ENVIRONS--A EUROPEAN VIEWPOINT

Policies governing the planning and regulation of new construction, and the purchase or soundproofing of existing structures in airport environs in France, Germany, Great Britain, and Switzerland are outlined. The noise exposure indices in use in these countries are given. Methods of reducing noise in highly populated areas, such as special arrival and departure procedures and curfews, are described together with considerations in use in the formulation of long-range land use policies for areas surrounding airports.

From International Air Transportation, Proceedings of the Conference, San Francisco, California.

Block, J (Paris Airport Authority, France)

American Society of Civil Engineers Proceeding Mar. 1975, pp 191-204

ACKNOWLEDGMENT: International Aerospace Abstracts

ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-10402

03 155840

## ENVIRONMENTAL ASPECTS OF AIRPORT DEVELOPMENT

Incorporation of noise nuisance assessments in planning of airports is discussed. The article addresses the need to evaluate expected traffic flows, noise levels of future aircraft (as announced by manufacturers), legislative restrictions on noise level, and the need for feedback from airport planners to industry and government on airport area noise loadings. Noise nuisance criteria are compared. Economic disadvantages of nighttime airport curfews are examined. Data on air pollution by airport operations are deemed inadequate. Noise associated with general aviation and training flights at smaller airports is also considered.

Stratford, AH (Stratford (Alan) and Associates Limited) *Airport Forum* Vol. 7 No. 2, Apr. 1977, pp 13-20

ACKNOWLEDGMENT: Massachusetts Institute of Technology

03 155854

## NOISE BURDEN FACTOR--NEW WAY OF RATING AIRPORT NOISE

The relative benefits and disadvantages which an airport offers to its neighboring community can be evaluated with the aid of a criterion termed the noise burden factor. This measure represents the days of serious noise nuisance to one house dweller for each passenger or freight unit arriving at or leaving the airport. The noise burden factor is shown to provide a concurrent means for comparing noise problems at different airports and for monitoring the effectiveness of noise control measures over a period of time.

Richards, EJ Ollerhead, JB (Loughborough University of Technology, England) *Sound and Vibration* Vol. 7 No. 12, Dec. 1973

ACKNOWLEDGMENT: International Aerospace Abstracts

03 155857

## AVIATION NEEDS AND PUBLIC CONCERNS--DISCUSSING NOISE, FULL AND AIRPORT PROBLEMS

The problems of aircraft noise and its reduction, and the growing demands on energy resources coupled with the rising fuel prices, are discussed. The growing scarcity of land suitable for airport sites is illustrated. Some background data is provided from related Organization for Economic Co-operation and Development (OECD) studies.

VanLennep, E (Oliver and Boyd, Limited)

Delft University of Technology Oct. 1973, 39 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
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03 155861

## AIR POLLUTION FROM FUTURE GIANT JETPORTS

Because aircraft arrive and depart in a generally upwind direction, the pollutants are deposited in a narrow corridor extending downwind of the airport. Vertical mixing in the turbulent atmosphere will not delute such a trail, since the pollutants are distributed vertically during the landing and take-off operations. As a consequence, airport pollution may persist twenty to forty miles downwind without much attenuation. Based on this simple meteorological model, calculations of the ambient levels of nitric oxide and particulates to be expected downwind of a giant jetport show them to be about equal to those in present urban environments. These calculations are based on measured emission rates from jet engines and estimates of aircraft performance and traffic for future jetports.

Fay, JA

Massachusetts Institute of Technology NASA-CR-142165, May 1970, 13 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

03 155863

## AIRPORTS AND THE ENVIRONMENT

Reduction and abatement of aircraft noise, economic political/social aspects of urban airport noise problems, management of airport planning, airport siting, and airport land area and facilities expansion are discussed. Experience with particular airport siting and noise problems are recounted (Osaka, Frankfurt, Paris, Stockholm-Arlanda, Copenhagen, Oslo). Transportation facilities and road access for passengers and work personnel to and from airport areas are discussed. Attention is given to histories of legal claims by owners of real estate against airports for impairment of property values, wildlife in the vicinity of airports, noiseproofing of structures at or near airports. Airport area use problems at London-Maplin, New York, and Zurich are also discussed.

Organization for Economic Cooperation and Devel 1975, 291 pp

ACKNOWLEDGMENT: International Aerospace Abstracts

03 155881

## AIRCRAFT NOISE RELIEF POTENTIAL AT MAJOR HUB AIRPORTS

The effectiveness of various strategies for alleviating noise due to aircraft operations over communities near hub airports is examined. Included are the effects of (1) power and flight path management, (2) measures for reducing source noise, (3) changes in the traffic mix, and (4) introduction of "quiet", advanced aircraft. The scenarios studied utilize recent traffic mixes observed at the Los Angeles International Airport as a baseline from which noise abatement alternatives are derived. The results indicate that introduction of quite aircraft with improved terminal area performance capability may effect containment of adverse noise impact within the confines of the airport boundary. Reductions in the residential area exposed to high noise levels is also noted when two-segment approaches are flown and when various retrofit techniques are employed.

Presented at a joint meeting Montreal, Canada, October 29-30, 1973.

Sokolsky, S (Aerospace Corporation)

Canadian Aeronautics and Space Institute, American Institute of Aeronautics and Astronautics Proceeding AIAA 73-1164, Oct. 1973, 13 pp, 25 Ref.

ACKNOWLEDGMENT: International Aerospace Abstracts

03 155883

## A SUGGESTED MODEL FOR AIRPORT AIR POLLUTION MODELLING

An atmospheric dispersion model has been developed for general use ranging from dispersion of a single local source to mesoscale or synoptic scale dispersion of air pollutants. The model is termed the Diffusion Wind Atmospheric Dispersion Model and allows meteorological conditions and pollutant source characteristics to vary in the horizontal, in the vertical, and in time. Several different pollutants can be dispersed simultaneously in the model, while processes such as fallout, deposition, and chemical transformation can be simulated. Application of the model to the air pollution problems associated with airfield operations can be shown.

From the 6th Conference, Aerospace and Aeronautical Meteorology, El Paso, Texas, November 12-15, 1974.

Shannon, JD (Oklahoma University)  
American Meteorological Society Proceeding 1974, 6 pp, 11 Ref.

ACKNOWLEDGMENT: International Aerospace Abstracts

03 155886

**PHYSICAL ENVIRONMENT--ENVIRONMENTAL IMPACT  
STATEMENT REQUIRED FOR GENERAL AVIATION AIRPORT  
CONSTRUCTION**

Environmental legislation affecting airports and the more common environmental effects resulting from airport construction are discussed with special emphasis on general aviation airports. The discussion is focused on the regulation of noise, pollution, and water quality.

From General Aviation and community Development which is available from NTIS.

Sincoff, MZ Dajani, JS  
Old Dominion University 1975, pp 81-87

ACKNOWLEDGMENT: National Aeronautics and Space Administration

03 155893

**GENERAL AVIATION AND COMMUNITY DEVELOPMENT**

The reports presented concern (1) general aviation components, (2) general aviation environment, (3) community perspective and (4) transportation and general aviation in Virginia.

Old Dominion University 1975, 268 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
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03 155905

**NOISE--THE TECHNICAL ASPECTS--AIRCRAFT OPERATIONS  
NEAR AIRPORTS**

Although there are many sources of noise around an airport, the dominant source is due to aircraft operations, including taking off, landing, and taxi maneuvers. Monitoring is one of the few methods open to authorities involved in airport operation in order to control this noise. Several automatic monitoring systems now in use at world airports are discussed, together with the standards adopted for aircraft noise control. The most comprehensive system of monitoring is that proposed for the state of California. This system not only regulates individual noise levels, but also noise exposure boundaries around the airports. It is difficult to see how this system could be applied to an airport such as Heathrow, with its complex routing system. The paper suggests how a compromise system could apply at this London airport, so that closer control of take-off and landing noise.

From Airports for the 80's Proceedings of the 4th World Airports Conference, London, England, 3-5 April 1973.

Large, JB (Southampton University, England) Lam, RC (Department of Civil Aviation, Australia)  
Institution of Civil Engineers Proceeding 1973, pp 141-146

ACKNOWLEDGMENT: International Aerospace Abstracts

03 155913

**THE DEVELOPMENT OF LUTON AIRPORT AND ITS EFFECT  
UPON THE NOISE CLIMATE OF THE AREA**

The basic method used to assess aircraft noise nuisance around airports in Great Britain relies on the correlation of subjective annoyance with a physical measure of the noise exposure. The unit of noise and number index (NNI), currently being taken as the standard is derived using the average peak noise level of aircraft and the number of aircraft heard on the ground. Changes in the noise exposure pattern around Luton Airport since 1969 are examined. The airport has the benefit of a noise monitoring system and this, in conjunction with the NNI monitoring study, has enabled the collection of good data used for making decisions which affect the airport development. The NNI contains of 1969 through and including 1973 are described in detail in addition to 1980 projections.

Waters, C (Stratford (Alan) & Associates, Limited) Noise Control and Vibration Reduction Vol. 6 May 1975, pp 157-161

ACKNOWLEDGMENT: International Aerospace Abstract  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A75-38923

03 155914

**REDUCING THE IMPACT OF AIRCRAFT NOISE. AN AIRLINE  
VIEWPOINT**

The problem solution is not entirely within the airline industry, and it can only be solved through a multilateral approach aimed at protecting the public interest by the development of common international policies. Four types of actions must be taken to achieve this goal of reducing aircraft noise, including controlling noise at the source; taking appropriate flight procedures; restricting the type of aircraft operable at a certain airport and by putting limits to the operating hours; and by controlling the development of airport surroundings.

From International Air Transportation. Proceedings of the Conference, San Francisco, March 24-26, 1975.

Eula, E (Alitalia Airlines)  
American Society of Civil Engineers Proceeding 1975, pp 93-108

ACKNOWLEDGMENT: International Aerospace Abstracts  
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03 155917

**STRATEGIES FOR ALLEVIATING IMPACT OF AIRCRAFT  
NOISE**

Reduction of the impact of noise can be achieved by three alternatives: (1) reducing the amount of noise generated at the source (modification of aircraft engine); (2) altering flight procedures, flight parts, and frequency of operations; and (3) changing land use surrounding the airport. A general mathematical programming model is developed for the evaluation of the three alternatives. The model is then applied to the first alternative, i.e., (1) to retrofit the aircraft using a new nacelle with sound absorbing materials in the engine inlet and along the internal walls of the engine air duct; and (2) to replace the existing aircraft by new widebody aircraft that feature quieter single-stage fan engines with a high bypass ratio such as Boeing 747 and McDonnell Douglas DC-10. The cost and effectiveness functions associated with each of the alternatives are constructed and the model calibrated using the available data. The mathematical programming model is then reduced to a linear program and applied to a retrofitting and replacement program.

Kanafani, A (California University, Berkeley) Mogharabi, A (Pahlavi University, Iran) ASCE Journal of Transportation Engineering Vol. 101 No. TE4, Nov. 1975, pp 657-668, 6 Fig., 4 Tab., 9 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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03 155920

**EFFECTS OF CESSATION OF LATE-NIGHT FLIGHTS ON AN  
AIRPORT COMMUNITY**

A telephone survey was conducted to assess the effects of cessation of late-night over-flights on communities to the east of Los Angeles International airport. A total of approximately 1400 interviews were conducted before, immediately after, and a month after the cessation of flights. No appreciable effects were observed in terms of reduction of annoyance, or lessened speech and sleep interference. However large, consistent and statistically significant differences in response patterns as a function of level of noise exposure were observed both before and after cessation of late-night flights. These results can be accounted for either in terms of the relatively small decrease in 24-hour exposure than the elimination of flights between 23.00 and 06.00 hours represented, or in the light of a parallel study which failed to show recovery in the abnormal steep patterns of long term area residents. The significance of these data for such issues as the proper weighting of nocturnal noise or the appropriate weighting for numbers of events depends on which of the two alternative interpretations is favored.

Fidell, s Jones, G (Bolt, Beranek and Newman, Incorporated) Journal of Sound and Vibration Vol. 42 No. 4, Oct. 1975, pp 411-427, 4 Fig., 6 Tab., 20 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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03 155921

**ENVIRONMENTAL NOISE AND ACOUSTICAL MODELING**

Shining high-frequency sound into a scale model of an auditorium or other room has been long used to aid design in architectural acoustics. The



technique is now being used to help solve noise problems outdoors. The article reports on studies that have been underway for five years to study noise propagation using physical scale models of such places as airport runways and city streets.

Lyon, RH *Technology Review* Vol. 78 No. 5, Mar. 1976, pp 61-67, 11 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

03 155926

## COMPARISONS OF VARIABILITY IN AIRCRAFT FLYOVER NOISE MEASUREMENTS

Data from controlled flight testing conducted for 11 aircraft noise certification programs under FAA FAR 25 show typical standard deviations for sets of EPNL and PNL values ranging from 0.8 to 1.4 dB. Much greater variability was found in the noise levels measured near the approach path to runway 21R at Detroit Metropolitan Airport during two ten-day periods of routine operations. EPNL, SEL, and maximum A-level data, classified in jet aircraft groups by number of engines (regardless of type), showed typical standard deviations ranging from 3.8 to 4.9 dB at the different ground measuring points. Correlation of the Detroit noise data with slant distance gave moderately high correlation coefficients, with 95% prediction intervals about the regression lines varying from plus/minus 5/4 to plus/minus 9/5 dB. The regression lines show quite good agreement, particularly in slope, with generalized noise level versus distance curves often used for noise exposure calculations. Correlations between different noise measures were high, as expected. However, prediction intervals about the regression lines were sizable, indicating distinct possibilities for occasional sizable errors in estimating one noise measure from another when analyzing aircraft flyover noise signals.

Bishop, DE (Booz-Allen and Hamilton, Incorporated) *Acoustical Society of America, Journal of* Vol. 58 No. 6, Dec. 1975, pp 1211-21, 9 Fig., 5 Tab., 19 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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03 155928

## ASSESSMENT OF CERTAIN CAUSAL MODELS USED IN SURVEYS ON AIRCRAFT NOISE ANNOYANCE

The aim of this article is to show that analysis of the connection between various items in questionnaires on aircraft noise, which have been used to suggest causal relationships, does not in fact prove any causality. Two published surveys are analyzed: one carried out around Heathrow Airport-London in 1961, the other around Kennedy Airport-New York in 1972. It is shown that from the sociological surveys undertaken to date, one can derive only on ordered sequence of verbal reactions to aircraft noise, and not a causal sequence between verbal reactions; the only clear cause of annoyance is the noise itself. It is suggested that future surveys on noise annoyance should include personality tests and health questionnaires, if one wishes to establish reliable causal sequences.

Alexandre, A (Organization for Economic Cooperation and Development) *Journal of Sound and Vibration* Vol. 44 No. 1, Jan. 1976, pp 119-125, 2 Tab., 11 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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03 155929

## EFFECTS OF AIRCRAFT NOISE ON THE MENTAL WISH OF PUPILS

In order to examine the effects of aircraft noise on the mentality of growing children, a simple search test and an adding test were applied to 1144 elementary school pupils who live around an airport, and in a quiet area, under the conditions of no stimulus sound, and jet noise stimulus 90 plus/minus 5 dB (A) respectively. The result was that children from relatively noisy living areas tended, when performing tests, to show occasional short periods in which they produced substantially less than their own average rate of work. A similar difference did not appear when working in noisy rather than quiet conditions, and it was considered to be something chronic about the children themselves. These results were independent of the sex of the subjects and the feelings of the subjects about aircraft noise.

Ando, Y Nakane, Y (Kobe University, Japan) Egawa, J (Osaka Educational University, Japan) *Journal of Sound and Vibration* Vol. 43

No. 4, Dec. 1975, pp 683-691, 5 Fig., 4 Tab., 10 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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03 155930

## EFFECTS OF AIRCRAFT NOISE ON MAN

The Deutsche Forschungsgemeinschaft and study of airport noise is reviewed, some further results are included. The study, which considered sociological, psychological and physiological impacts, also describes statistical and analytical methods.

Rinke, HO Martin, B Guski, R Rohrman, B Schumer, R Schumer-Kohrs, A *Journal of Sound and Vibration* Vol. 43 No. 2, Nov. 1975, pp 335-349, 12 Fig., 13 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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03 155931

## REGULATION OF TRANSPORTATION NOISE IN THE UNITED STATES

An overview is provided of the status of transportation-noise regulation in the United States, with special emphasis upon community-noise aspects, upon actions at the Federal level, and upon events resulting from the Noise Control Act of 1972. The Noise Control Act of 1972 is first reviewed, with emphasis on portions which can affect transportation noise. Regulatory actions affecting surface-transportation noise are reviewed, including those which recently have been or are about to be proposed by the EPA. In a review of regulation of noise from air transportation, emphasis is placed on current efforts underway, at both the US Environmental Protection Agency and the Federal Aviation Administration, to develop a comprehensive set of regulations on (a) flight operational rules for aircraft, (b) design modification of aircraft for limitation of their noise-emission characteristics, and (c) design and operation of airports and adjacent land uses for mutual compatibility.

Cuadra, E Sperry, WC Roper, WE (Environmental Protection Agency) *Journal of Sound and Vibration* Vol. 43 No. 2, Nov. 1975, pp 449-460, 22 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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03 155932

## AIRCRAFT CONTROL MEASURES FOR EMISSION REDUCTION

This work is based on a model of emission-producing activities at the Hartsfield Atlanta International Airport and emissions from additional sources in the region surrounding the airport. A steady-state Gaussian plume dispersion model, developed previously, was used to determine pollutant concentrations at selected reception sites. The model of the Atlanta airport was assembled to evaluate the results of a field test of one of the strategies (engine shutdown during taxiing) performed there in late 1973. The results of that field test are reported elsewhere. A full discussion of the interpretation of the comparison between modeled and monitored pollutant concentrations during the field test, and the examination of alternative strategies noted here are contained in the final report of this project.

Cirillo, RR Tschanz, JF Camaioni, JE (Argonne National Laboratories) *Air Pollution Control Association, Journal of* Vol. 26 No. 5, May 1976, pp 500-501, 2 Tab., 9 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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03 155933

## REALISTIC MIXING DEPTHS FOR ABOVE GROUND AIRCRAFT EMISSIONS

This paper examines current emission control philosophy, which according to the US Environmental Protection Agency should be based upon the significance of the particular polluting source. The problem of accounting for above ground aircraft emissions is considered. Daily inversion height data are used to determine a realistic vertical containment altitude by aircraft emissions. Problems in obtaining good inversion data are described. Aircraft emissions at Los Angeles International Airport are adjusted to reflect real world inversion conditions on those days when the inversion height is low enough to significantly influence air pollution levels.

Segal, HM (Boeing Company) *Air Pollution Control Association, Journal of* Vol. 25 No. 10, Oct. 1975, pp 1054-56, 4 Fig., 6 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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## 03 155934

# ESTIMATE OF CONTRIBUTION OF JET AIRCRAFT OPERATIONS TO TRACE ELEMENT CONCENTRATION AT OR NEAR AIRPORTS

Samples of ASTM type A jet fuel were analyzed for trace element content by instrumental neutron activation techniques. Forty-nine elements were sought. Only ten, aluminum, gold, indium, lanthanum, titanium, vanadium, barium, dysprosium, tellurium, and uranium, were observed at levels above the detection limits encountered; of these only aluminum, titanium, and barium were present at concentrations greater than 0.1 ppm. Estimates of exhaust gas concentrations are made, and the ambient contribution at or near airports is calculated by using the Los Angeles International Airport dispersion model. It is shown that the ambient contribution is about an order of magnitude below typical urban levels for virtually all elements sought.

Fordyce, JS Sheibley, DW (Lewis Research Center, NASA) *Air Pollution Control Association, Journal of* Vol. 25 No. 7, July 1975, pp 721-724, 4 Tab., 14 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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## 03 155935

# A FINITE LINE SOURCE DISPERSION MODEL FOR MOBILE SOURCE AIR POLLUTION

The paper describes briefly the formulation and application of a finite line source dispersion model constructed on the basis of a Gaussian-type transport kernel. The formulation is sufficiently general that any arbitrary orientation of the line can be handled. For cases where the line is at small angles with respect to the wind, approximate expressions as well as segmentation of the line, if necessary, are used. There are integrated into the general algorithmic scheme by means of a series of geometric tests. The general capabilities of the model are tested first with some hypothetical cases and then with actual air quality data. The latter case studies correspond to three separate periods of air quality monitoring at O'Hare Airport during which the aircraft emissions and the ground vehicle emissions play alternately important roles. The generally good agreement between model predictions and air quality data provides support for the validity of the approach. The overall efficiency of the model in terms of computer time as well as its limitations are briefly discussed.

Wang, JT Rote, DM (Argonne National Laboratories) *Air Pollution Control Association, Journal of* Vol. 25 No. 7, July 1975, pp 730-737, 6 Fig., 3 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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## 03 155936

# TTS FROM NEIGHBORHOOD AIRCRAFT NOISE

In an attempt to determine the effect on the auditory threshold of the worst "neighborhood" exposure to aircraft noise that can reasonably be expected, tape-recorded overpasses, both landings and takeoffs, were reproduced at 111 dBA peak level in a reverberant room. Six-hour exposures to landings or takeoffs at the rate of 1 per 1.5 or 3 min were given to one of two groups of five normal listeners. The mean TTS sub 2 (temporary threshold shift 2 min after exposure) did not reach 5 dB at any frequency in any condition. The possibility of hearing damage from such exposures is therefore judged to be remote, despite the fact that the 8-h "equivalent levels" of these exposures are as high as 90 dBA. The importance of interruptions in reducing risk is emphasized.

Ward, WP Cushing, EM Burns, EM (Minnesota University, Minneapolis) *Acoustical Society of America, Journal of* Vol. 60 No. 1, July 1976, pp 182-185, 2 Tab., 12 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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## 03 155937

# MEASURED JET NOISE COMPARED TO CALIFORNIA NOISE CODES AND HEALTH LIMITS

In December 1971, maximum allowable limits on aircraft noise at California airports effective in the Public Utilities Code (PUC). Noise-exposure limits are specified in terms of a base parameter, Single Event Noise Exposure Level (SENEL), which is an integration of A-weighted noise level with time. Measurements of conventional jet aircraft landing-noise levels at Los Angeles International Airport (LAX) were made and compared to the PUC SENEL limits, to the "standard" SENEL values used for mapping community noise exposure zones, and to noise limits for hearing and health conservation. The measurement survey indicated that at 1 NM from landing threshold, the standard SENEL limits were exceeded by 50 to 15 dB 50% of the time, and the California SENEL limits were exceeded about 50% of the time. Data from special flight tests for the FAA indicated that the implied SENEL limits would be violated about 35% of the time. If violators were cited according to the PUC (\$1000 per violation), the resulting fines for landing operations would be about \$200,000 per day, or \$70 million per year, at LAX.

Lane, SR (California University, Berkeley) *Acoustical Society of America, Journal of* Vol. 56 No. 6, Dec. 1974, pp 1805-10, 4 Fig., 2 Tab., 20 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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## 03 155938

# PROPAGATION IN AN INVERSION AND REFLECTIONS AT THE GROUND

The propagation of sound is considered for an atmosphere in which the sound velocity increases linearly with height. For source and receiver separation large compared with their heights above the ground there are in general four possible ray paths between source and receiver having a given number of ground reflections  $N$  greater than 1. For  $n = 0$ , i.e., no reflections, there is one ray path; and for  $n = 1$  there are three possible ray paths. By suitable grouping of the ray paths it is possible to evaluate the effects of reflection at a ground of known, finite impedance (especially near the source), assuming coherence between neighboring rays; and also to evaluate the net sound intensity of waves traveling via more widely separated paths in the normally turbulent atmosphere assuming incoherence. A temperature inversion is found, using ray theory, to increase the sound level at large horizontal distances inside the shadow region due to finite surface impedance, that is otherwise predicted by wave theory for a neutral atmosphere.

Embleton, TFW Thiessen, GJ Piercy, JE (National Research Council of Canada) *Acoustical Society of America, Journal of* Vol. 59 No. 2, Feb. 1976, pp 278-282, 6 Fig., 13 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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## 03 155939

# JUDGED ACCEPTABILITY OF NOISE EXPOSURE DURING TELEVISION VIEWING

Noise masking of television audio signals by flyovers is the most frequently mentioned problem of airport neighbors. This problem was studied in the laboratory using artificial noise. Three studies varied the intensity, duration, and rate (noises per hour) of the noises. Acceptability was found to approximate a logarithmic function of noise energy for changes in intensity, duration, and rate. Thus, the equal-energy principle, which has been generally observed in abstract psychometric experiments, was confirmed in this more realistic and representative task. A fourth study showed aircraft-flyover recordings to be more acceptable than artificial noises even though they had equivalent peak levels and masking durations. This difference can also be explained by the equal-energy principle, since the flyovers had lower average (or integrated) energy.

Langdon, LE Gabriel, RF (Douglas Aircraft Company, Incorporated) Creamer, LR (California State University, Long Beach) *Acoustical Society of America, Journal of* Vol. 56 No. 2, Aug. 1974, pp 510-515, 8 Fig., 7 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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03 155940

## JET NOISE AT SCHOOLS NEAR LOS ANGELES INTERNATIONAL AIRPORT

In this study, indoor and outdoor measurements of jet aircraft noise were made at seven schools beneath the eastern approach paths to the Los Angeles International Airport. At five elementary schools, the jet noise in the schoolyards ranged from 96 to 118 dBC and constituted a high risk of hearing damage for the children. The frequency of jet aircraft overflights averages one per 2-min interval for a total of about 200 per school day (8:30 a.m.-3:30 p.m.). The corresponding jet-noise levels in the classroom (80% of which are not air-conditioned or acoustically treated) ranged from 80 to 96 dBA and caused continued disruption of communication and the learning processes. An investigation of aircraft operation alternatives indicated that the noise could be reduced by 10 dB or more if engine power were properly managed when the aircraft approaches the school areas, or if the aircraft approached at higher altitudes and landed further to the west on the unused 6000-ft-long portion of the 12,000-ft-long runways.

Lane, SR Meecham, WC (California University, Los Angeles) *Acoustical Society of America, Journal of* Vol. 56 No. 1, July 1974, pp 127-131, 4 Fig., 1 Tab., 10 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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03 155941

## MEASURED VARIATIONS IN AIRCRAFT NOISE NEAR ARLANDA AIRPORT

Tape recordings were made of ca 1,500 takeoffs at Arlanda Airport by means of an automatically operating recording device. Type of aircraft and destination as well as temperature, air humidity and wind velocity, and direction were registered. Correlation analyses of peak sound levels in dB4 and meteorological factors were made. Sound level showed no significant covariation with humidity and temperature, but a positive correlation to the wind velocity from the aircraft towards the measuring station was found. The mean values measured verify theoretical calculation of the sound level from standard noise contours according to ISO Recommendation No. 507 and NASA CR-767 and also show that calculations are more accurate than occasional measurements. Parts of the data were also analyzed as to the difference among dB4, PNdB, EPNdB, and dBD. High correlations among these different units were found.

Kajland, AR *Acoustical Society of America, Journal of* Vol. 56 No. 2, Aug. 1974, 1 Fig., 4 Tab., 7 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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03 155942

## SCALING LOUDNESS, NOISINESS, AND ANNOYANCE OF AIRCRAFT NOISE

Tests are made on human capabilities to differentiate and to scale aircraft noise with regard to three psychological attributes encountered in social survey research on ambient noise. Observers in carefully designed laboratory situations were able to use and produce scales of loudness, noisiness, and annoyance for aircraft noise. In general, such noise was judged to be more annoying than noisy and more noisy than loud.

Berglund, B (Stockholm University, Sweden) Berglund, V Lindvall, T *Acoustical Society of America, Journal of* Vol. 57 No. 4, Apr. 1975, pp 930-934, 2 Fig., 1 Tab., 15 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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03 155943

## AIRCRAFT COMMUNITY NOISE RESEARCH AND DEVELOPMENT: AN HISTORICAL OVERVIEW

The noise-reduction research and development programs of The Boeing Company are summarized for the period between the early 1950's and the present time. Acoustic treatments are described that permit all current Boeing turbofan-powered commercial aircraft models to comply with U.S. Government and international noise regulations. Some unsolved problems are described.

Blumenthal, VL Russell, RE Streckenbach, JM (Boeing Company) *Acoustical Society of America, Journal of* Vol. 58 No. 1, July 1975, pp

124-143, 40 Fig., 5 Tab., 100 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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03 155944

## VALIDITY OF AIRCRAFT NOISE DATA

An analysis is made of noise measurements taken at various distances from a number of aircraft during noise flight tests. Limitations associated with such measurements and analysis are pointed out and cautions are cited against possible misuse of the data. Of primary concern is the use in airport noise studies, where calculated "footprint" areas that may contain large tolerances in areas are currently being used for decision making.

Sekyra, CA Storey, WC Yates, R (Boeing Company) *Acoustical Society of America, Journal of* Vol. 58 No. 1, July 1975, pp 192-200, 3 Fig., 2 Tab., 6 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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03 158221

## AIRCRAFT NOISE REDUCTION

This paper describes the acoustical treatment used in the engine nacelles on DC-10 airplanes. The special acoustical features of the cabin sidewall insulation and the airplane's interior panels are also described. Results of incorporating these various noise-control features are given in terms of flyover noise levels during takeoff and landing and in terms of cabin noise levels during cruise.

Presented at the 51st Audio Eng Society Convention, May 13-16, 1975.

Marsh, AH (McDonnell Douglas Corporation)  
Audio Engineering Society Preprint 1029(G-4), 1975, 9 pp

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

03 158238

## ACOUSTIC DATA RECORDING AND DATA ANALYSIS SYSTEMS

Noise measurement systems have, by necessity, undergone dramatic changes during the development years to keep pace with requirements. Current system designs provide calibrations traceable to NBS, increased sampling speeds, better resolution, more accurate and repeatable test results and meet the need of processing large amounts of data in short time periods. There have been improvements in the measurement of the environmental conditions affecting the noise and changes to the physical characteristics of test facilities to reduce ground reflections and minimize obstacles impeding the noise path.

22nd Annual Technical Meeting of the Institute of Environmental Sciences, Proceedings, Environ Technology '76 Philadelphia, Pennsylvania, 26-28 April 1976.

Andrews, JJ (Pratt and Whitney Aircraft)  
Institute of Environmental Sciences 1976, pp 110-115

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

03 158239

## NOISE TECHNOLOGY FOR FUTURE AIRCRAFT POWER PLANTS

Applications range from growth versions of current production engines to future advanced supersonic transport applications. Although a variety of complex and challenging noise-suppression problems are identified, a sampling of several basic problems common to a variety of engine designs are discussed in detail. Among these are: the prediction of fan noise generation and propagation in treated ducts, the use of mixer nozzles to reduce jet exhaust noise, and the prediction and absorption of combustion noise.

Kester, JD (Pratt and Whitney Aircraft) Peracchio, AA *ASME Journal of Mechanical Engineering* Vol. 99 No. 1, Jan. 1977, pp 40-47, 13 Ref.

ACKNOWLEDGMENT: EI  
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03 163480

**AIRCRAFT FLYOVER MEASUREMENTS**

Aircraft noise measurements during flyovers with the aid of measuring instruments placed at relevant positions on the ground are dealt with. The subject is categorized into two main divisions, namely measurements for specific research purposes, and data collected in order to ascertain whether an aircraft meets noise regulations.

AGARD Lecture Series No. 80, Jan. 1977 on Aerodynamic Noise at von Karman Institute, Genese, Belgium, 6-9 December 1976.

House, ME

Advisory Group for Aeronautical Res & Dev-NATO Lect Ser. Paper No. 9, 1976; 14 pp

ACKNOWLEDGMENT: EI

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03 201520

**THE COST OF NOISE**

The effect of noise from motorways or airports on local residents is considered and related to the financial value that might be considered reasonable for compensation. The results of a survey are discussed in which 530 residents in south east England, but outside of greater London, were asked to complete A questionnaire designed to assess endurance and dislocation costs. /TRRL/

Plowden, S

Metra Consulting Group Limited Nov. 1970, 19 pp, 3 Fig., 2 Tab.

ACKNOWLEDGMENT: Transport &amp; Road Research Lab /UK/

03 223470

**COST OF NOISE**

The findings of a British project on the economic evaluation of noise nuisance has been published recently. The project was based on work carried out for the British airports authority. The principles described apply very widely and should be of value when a local authority is faced with any issue involving the imposition of noise on a residential area. A table is given describing the social costs of noise to home owner-occupiers. The noise and number index can be used as a measure to appraise the annoyance caused by noise from various sources-not only aircraft. /author/

Surveyor - Public Authority Technology Vol. 137 No. 4103, Jan. 1971, p 15

ORDER FROM: ESL

03 223511

**USE AND ENJOYMENT OF LAND-COMPENSATION FOR NOISE DAMAGE**

Noise emanating from the use of facilities owned by the government or quasi-public entities having the power of eminent domain are presented. Noise source in nearly all cases are from transportation facilities. The law of eminent domain is emerging as a significant tool in obtaining redress for intangible interference with the use and enjoyment of private property. The expansion of concepts to permit recovery in inverse condemnation has been accomplished largely in aviation cases where noise was the principal element of damage. Whether these concepts of taking and property can be transferred to highway cases and other elements of damage remains an open question. /author/

Harrison, OC *Natural Resources Lawyer* Vol. 4 No. 2, Apr. 1971, pp 429-452

03 223857

**EPA ANALYSIS OF NOISE PROBLEMS POINTS WAY TO FUTURE LEGISLATION**

At the end of 1971 the u.s. Environmental Protection Agency presented to congress a comprehensive, multivolume report on noise in the United States and abroad. The report is intended to assist federal, state, and local agencies in preparing noise control legislation and to serve engineers and designers of transportation equipment and other devices powered by internal combustion engines. In addition to analyzing and evaluating noise from a large variety of sources, the report discusses the increase in powered noise sources, which in every case outstrips the growth in population. The present article reviewing the report is divided into the following topical sections: legislative jurisdiction and requirements, existing federal legislation and

controls, noise controls at state level, local noise level controls, reduction of aircraft noise, effects of V/STOL aircraft growth, projected increases in general aircraft noise, control of ground-vehicle noise, truck and bus noise, noise from recreational vehicles, construction equipment noise, and noise from other sources.

*Automotive Engineering* Vol. 80 No. 4, Apr. 1972, pp 28-35, 7 Fig., 4 Tab.

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03 224129

**MODELING OF V/STOL NOISE IN CITY STREETS**

The goals of this work were two-fold. First, to develop modeling techniques that will be helpful in studying a variety of noise propagation problems. These involve not only aircraft sources, but also surface traffic (automobiles, trucks, and rail vehicles) as well. The second and more narrow goal is the application of these modeling techniques to a specific problem, the propagation of V/STOL aircraft noise into an urban area. /author/

Lyon, RH Pande, L Kinney, WA

Massachusetts Institute of Technology Tech Rept Nov. 1971, 55 pp

Contract DOT-TSC-93

ACKNOWLEDGMENT: NTIS

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PB 211 953

03 224654

**NOISE EXPOSURE FORECASTS: EVOLUTION, EVALUATION, EXTENSIONS AND LAND USE INTERPRETATIONS. FINAL REPORT**

This two-part report discusses the concept of noise exposure forecasts (nef) for predicting a single number rating for the cumulative noise caused by aircraft operations intruding into airport communities. Part I describes methods for relating aircraft noise exposure to community response. Part 2 interprets the noise exposure due to aircraft operations (in nef values) in terms of estimated impact on land use for the purpose of providing planning and development guides. /TRRL/

Galloway, WJ Bishop, DE

Bolt, Beranek and Newman, Incorporated Aug. 1970, 78 pp, 16 Fig., 3 Tab., Refs.

ACKNOWLEDGMENT: TRRL

03 226630

**ANALYSIS OF GROUND OPERATIONS AT AIRPORTS**

The pollution source inventory for airports include airplane operations (categorized according to taxi, idle, take-off and landing), aircraft support vehicle operations vehicular movements, stationary power and heat-source operations, and fueling operations. Also measurements are given of carbon monoxide, hydrocarbons, particulates, oxides of nitrogen and meteorological parameters. A mathematical dispersion model is used to derive contour maps of individual pollutant concentrates. /author (gra)/

Cairns, R

Boeing Scientific Research Laboratories July 1971, 52 pp, Refs.

ACKNOWLEDGMENT: International Aerospace Abstracts

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AD-733111

03 228038

**DERIVING THE TRAFFIC CONSEQUENCES OF AIRPORT LOCATION ALTERNATIVES**

The primary objectives of the research reported in this paper were to structure the airport location process and to develop a methodology for deriving the traffic consequences of various airport location alternatives. A number of interconnected analyses were identified in the location procedure, including demand forecasting, constraint recognition, cost estimates, and airport location evaluation. A demand model based on systems engineering concepts was presented. Linear graph analysis was used to describe mathematically the travel volumes on each link of the intercity travel network. It was shown that by using the complementary travel pressure variable, the traffic consequences of various airport locations on the short-haul travel market could be derived. Finally, the results of the model

were used to determine the user travel benefits associated with each of three Toronto airport location alternatives. /author/

Pearson, PM McLaughlin, WA *Highway Research Record, Hwy Res Board* No. 322, No Date, pp 84-95, 6 Fig., 3 Tab., 19 Ref.

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03 239367

## OUTDOOR NOISE, TRANSPORTATION, AND CITY PLANNING

Vehicular surface traffic is the foremost noise pollutant now, while aircraft will likely become the most pervasive and disturbing source of urban noise in the future. Noise control requires the setting of permissible noise limits, monitoring existing and potential sources of noise, and imposing fines to assure compliance with regulations. Recommendations are given concerning reduction of noise at the source (auto and aircraft engine and mechanical equipment noise limitations), reduction of the spread of noise (acoustical insulation standards for apartments and homes in noisy areas), reduction of the areas in which noise is permitted (land use planning to surround noisy freeways and airports with buffer or industrial areas, limiting the number of people affected). Government offices should be set up specifically to deal with these problems.

Branch, MC *Traffic Quarterly* Vol. 25 No. 2, Apr. 1971, pp 166-188, 4 Fig.

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03 239973

## OUTDOOR NOISE AND THE METROPOLITAN ENVIRONMENT: CASE STUDY OF LOS ANGELES WITH SPECIAL REFERENCE TO AIRCRAFT

This comprehensive study contributes to the knowledge of growing urban environmental noise pollution. The authors make seventeen recommendations covering new laws, noise control operations, gathering necessary information, and persuading the federal government and businesses to do their share in combating noise pollution. Special reference is made to noise created by aircraft. Proposals are presented for control over different noise sources, including fines for violators. An extensive bibliography is appended. /author/

Branch, MC Beland, RD  
Transport and Road Research Laboratory 1970, 60 pp

ACKNOWLEDGMENT: TRRL

03 240207

## PRELIMINARY EVALUATION OF THE EFFECT OF A DYNAMIC PREFERENTIAL RUNWAY SYSTEM UPON COMMUNITY NOISE DISTURBANCE

A dynamic preferential runway system (dprs) was developed for John F. Kennedy international airport for the purpose of controlling short term noise exposure in the neighboring communities. The dprs is a computer-aided procedure for optimum selection of runways from the standpoint of noise and is based upon a community disturbance model which takes into account flyover levels, size of exposed populations, time of day and week, and persistence of overflights. A preliminary evaluation of the dprs is presented on the basis of social survey data and telephone complaint records, for the trial period of August and September 1971. Comparative use is made of data taken in a previous survey of the same community areas in 1969. /author/

Patterson, HP Edmiston, RP Connor, WK  
Tracor, Incorporated TRAC PROJ 076-163-1, Feb. 1972, 91 pp, Refs.

Contract NASW-2293

ACKNOWLEDGMENT: International Aerospace Abstracts

03 240691

## DECISION MODEL FOR LOCATING CONTROVERSIAL FACILITIES

Locating public facilities, such as highways or airports, which generate significant public opposition, requires a more sophisticated methodology than the traditional least-cost procedures for minimizing physical costs. Two models which evaluate the effects of opposition on the expected total costs of implementation are discussed—a short-run political placation model and

a long-run welfare distribution model. A strategy of side-payments, or concessions in the form of additional facilities or services, is demonstrated within the frameworks of the models. The short-run placation model can be treated either as a descriptive tool or normative approach for locating these facilities while the long-run welfare model prescribes a more equitable distribution of facilities and their essential side-payments. /author/

Mumphrey, AJ Seley, JE Wolpert, J *American Institute of Planners, Journal of* Vol. 37 No. 6, Nov. 1971, pp 397-402

03 240761

## AIRCRAFT NOISE AND LAND USE ANALYSIS

Two separate but related activities which were undertaken to provide a tool for the evaluation of changes in aircraft noise around airports are presented. The two activities involved are, first, the development of extensive and detailed data on land uses around the three major air carrier airports in the area encompassed by the regional airport systems study; and, secondly, the creation of a computer-based system for manipulating the data so that it can be conveniently used for the study of alternative airport development plans. As inputs, the analysis uses the noise contours computed for the regional airport systems study and detailed land use data prepared by the regional airport systems study. The computer program for merging the land-use data and the noise contours is described. /author/

Dygart, PK Ungerer, JA Collins, FL  
Association of Bay Area Governments Mar. 1972, 46 pp, Refs.

ACKNOWLEDGMENT: Scientific & Technical Aerospace Repts

03 240791

## ENERGY/FUEL SHORTAGE AND LAND DEVELOPMENT TRENDS IN THE RICHMOND METROPOLITAN AREA: A SURVEY

Responses of 59 major private firms in the Richmond metropolitan area to a survey questionnaire in January 1974, indicated that the energy/fuel shortage is likely to cause, and has already caused, significant changes in the thinking and actual decisions (including indecisions) in their business activities involving land development and real estate. Also indicated is more caution and a resultant slow-down in development of outlying suburbs. A strategy of side-payments, or concessions in density development is discussed. While the automobile continues to be considered somewhat more important than bus transit and other means of travel for residential, commercial and industrial development, bus transit is now rated more important than the automobile in evaluating sites for large-scale office development.

*American Institute of Planners, Journal of* Vol. 37 No. 6, Nov. 1971, pp 397-402

03 260837

## NOISE CONTROL LEGISLATION

The author discusses the role of the new local environmental protection agencies which are being established in the USA for the purpose of implementing noise control legislation. The types of noise to be covered by the new legislation are outlined, and the factors of noise which affect its "pollution level" are summarized, together with noise rating instrumentation and its approximate cost. The correlation between noise rating methods and subjective response is discussed, and the rating schemes expected to be used in the new legislation are described. The expected legislation relating to the control of noise from vehicles, aircraft, construction equipment, industrial areas, residential areas and multi family dwellings is discussed in detail. This paper was presented as paper No. 72-151 at the 65th Annual Meeting of APCA at Miami Beach in June 1972. /TRRL/

Smith, WA (University of South Florida) *Air Pollution Control Association, Journal of* Vol. 23 No. 4, Apr. 1973, pp 251-56, 5 Fig., 3 Tab., 13 Ref.

ACKNOWLEDGMENT: TRRL

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03 261041

## NOISE CONTROL THROUGH LEGISLATION

Today's noise sources consist of so vast an array of offenders that we make no attempt to enumerate them in any kind of comprehensive manner. The dominant sources in terms of disturbances to many people are: trucks, automobiles, airplanes, trains, industrial manufacturers, construction and

air handling. Industrial plant noise levels rise to values known to be destructive to the hearing mechanism. Accurate determination of the sensitivity of ears to noise has taken several decades to establish. Studies had to be indirect and of a statistical nature because the simple direct experiment of testing to destruction is obviously not acceptable in this instance. The difficulties were further compounded by the very wide range of individual hearing susceptibility to noise. This means that conclusions had to be based on enormous quantities of data. Ultimately hundreds of thousands of case histories were studied, and it became possible to define with reasonable precision what percentage of people would lose hearing acuity after exposure to any given noise level for specific durations.

Proceedings of Purdue Noise Control Conference, Purdue University, 14 July 1971.

Karplus, HB (Illinois Institute of Technology)  
Purdue University July 1971, 4pp, 4 Fig, 4 Tab, 9 Ref

ORDER FROM: Purdue University, Department of Mechanical Engineering,  
West Lafayette, Indiana, 47906

#### 03 261047

##### A STUDY OF THE MAGNITUDE OF TRANSPORTATION NOISE GENERATION AND POTENTIAL ABATEMENT

The effectiveness of transportation noise abatement may depend upon the creation and enforcement of appropriate legislation. Existing regulations and enforcement experience have been analyzed for air and surface transportation at the Federal, state and local level. The influence of the public and industrial self-regulation have also been investigated. The Federal Government can regulate the noise characteristics of new aircraft and the operation of all aircraft. The specification of an acceptable airport noise environment still rests with the airport proprietor. State and local governments have adopted motor vehicle noise control regulations. New York and California have adopted numeric limits while the other states only prohibit excessive noise without specifying what it is. Federal authority exists to insure that highway noise levels will be compatible with roadside land uses. This authority will take effect on July 1, 1972 and applies only to Federally funded developments. Railroads and mass transit do not appear to pose great noise problems at this time compared to aircraft or highways. Several regulatory actions are recommended and discussed as they pertain to the control of air and surface transportation generated noise.

Office of Noise Abatement Vol. 7 OST-ONA-71-1, Nov. 1970, 82pp

Contract DOT-OS-A9-018

ACKNOWLEDGMENT: Office of Systems Development and Technology/OST  
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#### 03 261048

##### A STUDY OF THE MAGNITUDE OF TRANSPORTATION NOISE GENERATION AND POTENTIAL ABATEMENT

Evaluations of the effectiveness of transportation noise abatement require the use of a measure which relates individual and community reactions to transportation noise. Previous studies were examined to determine how well various measures predicted response to noise. A-weighted Sound Level (in dBA) and Noise Pollution Level (in dBA) were examined to determine their relationships to other measures and their prediction of reaction, i.e., loudness, annoyance, noisiness. The A-weighted sound level, on the average, correlated as well with subjective response as the other measures. Only for jet aircraft pure tones was there a significant predictive performance difference between Effective Perceived Noise Level (EPNL) and dBA, favoring EPNL. These differences were not considered important for this study since the correlations between dBA and subjective responses were generally greater than 0.90. Average community response measures have been developed for aircraft and motor vehicle noise. Using the aircraft Noise and Number Index and motor vehicle Traffic Noise Index data, the Noise Pollution Level was shown to correlate as well with average community response as both of the measures. Since Noise Pollution Level is compatible with the use of dBA for individual vehicles, its selection as a community measure complements the choice of dBA as a vehicle measure.

Project sponsored by Department of Transportation.

Serendipity, Incorporated Final Rpt Vol. 2 OST-ONA-71-1, Nov. 1970, 116 pp

Contract DOT-OS-A9-018

ACKNOWLEDGMENT: Office of Systems Development and Technology/OST  
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#### 03 261050

##### NOISE CONTROL-HEARINGS BEFORE THE SUBCOMMITTEE ON PUBLIC HEALTH AND ENVIRONMENT

The texts of House of Representative Bills H.R. 5275, H.R. 923, H.R. 3364, H.R. 6002, H.R. 6986 and H.R. 6988 concerning control of the generation and transmission of noise detrimental to the human environment; establishment of an office of noise abatement control within HEW; and the requirement of disclosure of operational noise levels of machinery distributed in interstate commerce are given. Included also is a report of the Environmental Protection Agency, and additional material submitted for the record by the Air Transport Association; Airport Operators Council International; American Public Health Association; American Trucking Assoc.; the U.S. Bureau of Standards; the UAW; National Wildlife Federation; Federal Aviation Administration; Motorcycle Industry Council, Inc; and others; statements of interested individuals, Congressmen, scientists and administrators; a copy of FAR part 36 on aircraft noise certification. Emphasis is on aircraft noise, sonic boom, highway vehicle noise, industrial and general environmental noises.

Publications of the Committee on Interstate and Foreign Commerce, U.S. House of Representatives, 92nd Congress, 1st Session, Rayburn Bldg, Washington, D.C.

Government Printing Office June 1971, 504pp

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#### 03 261122

##### A SOCIAL SURVEY INTO ANNOYANCE CAUSED BY THE INTERACTION OF AIRCRAFT NOISE AND TRAFFIC NOISE

The procedure which was adopted to investigate the community response to combined noise from aircraft and road traffic is described. A social survey was conducted at nine sites at three levels of aircraft and traffic noise with thirty-five interviews per site. The mean results without regard to traffic noise level show good agreement with previous data, but there are significant variations with respect to traffic noise level. The use of the noise pollution level concept, which describes the noise climate as a function of mean energy level and the standard deviation of sound level, leads to strong correlation and median dissatisfaction with the total noise environment. (Author)

Bottom, CG Waters, DM

Loughborough University of Technology, England TT-7102, 1971, 15 pp, 10 Fig., 1 Tab., 8 Ref.

ACKNOWLEDGMENT: National Aeronautics and Space Administration (N71-34019)

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N71-34019

#### 03 261131

##### NOISE ASSESSMENT GUIDELINES

These guidelines are presented as part of a continuing effort by the Department of Housing and Urban Development to provide decent housing and a suitable living environment for all Americans. The procedures described here have been developed so that people without technical training will be able to assess the exposure of a housing site to present and future noise conditions. The assessment is presented as an evaluation of the site's exposure to three major sources of noise--Aircraft, Roadways, and Railways.

Schultz, TJ McMahon, NM

Department of Housing and Urban Development BBN Rpt. No. 2176, Aug. 1971, 20pp, 4 Fig, 4 Tab

ORDER FROM: Department of Housing and Urban Development, 451 7th Street, SW, Washington, D.C., 20410

#### 03 261137

##### TRANSPORTATION NOISE AND NOISE FROM EQUIPMENT POWERED BY INTERNAL COMBUSTION ENGINES

The report describes noise sources and their impacts. Transportation sources covered are: Commercial Aircraft, V/STOL aircraft, general aviation aircraft, highway vehicles, rail systems, ships, and recreation vehicles. Devices powered by internal combustion engines include chain saws, lawnmowers, model aircraft, battery chargers, etc. (Author)



Wyle Laboratories Dec. 1971, 427 pp  
 ACKNOWLEDGMENT: NTIS (PB-208660)  
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PB-208660

03 261149

## NOISE POLLUTION AND THE LAW. THE NOISE CRISIS

Starting with general remarks on acoustic terminology and noise and hearing, the major sources of noise in metropolitan areas are identified as construction and transportation sources. The motor vehicle noise level contribution of automobiles and trucks was partially determined by the 1964 California Highway Patrol Study. The Engine, exhaust, transmission, tires, and outer surfaces of the vehicle are noise sources to be studied and dealt with. The aircraft noise problem is widespread. A federal law of 1968 required the FAA to undertake the control and abatement of aircraft noise. Flight control and acoustical design are necessary measures for these purposes. Location of airports further from urban centers and the development of high speed ground transportation are also valid principles. The final question is whether the side effects of the SST including sonic boom will entirely preclude the use of this advanced transportation facility.

Anthrop, DF  
 Hein (William S) and Company, Incorporated June 1970, pp 3-10, 5 Fig., 23 Ref.

ORDER FROM: Hein (William S) and Company, Incorporated, 1285 Main Street, Buffalo, New York, 14209

03 261216

## A SURVEY INTO THE ANNOYANCE CAUSED BY AIRCRAFT NOISE AND ROAD TRAFFIC NOISE

The results of a social survey designed to investigate the influence of background (road traffic) noise on annoyance due to aircraft noise, and on general dissatisfaction with the total noise environment are presented. Nine sites with 3 aircraft and 3 traffic conditions were selected and 35 people per site interviewed. The regression lines for site mean aircraft annoyance scores (Guttman Scale) for each traffic condition show that the same annoyance score is achieved at an aircraft exposure 10 NNI lower, when traffic is reduced from heavy to access only. The general noise dissatisfaction shows an increase with traffic at low NNI, but a decrease at high NNI. The use of the noise pollution level unit satisfactorily explains this result, increasing the correlation coefficient for the grouped data from 0.94 against NNI to 0.96. (Author)

Bottom, CG Waters, DM  
 Loughborough University of Technology ITT-7204, 1972, 39 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration (N72-26082)

ORDER FROM: NTIS

N72-26082

03 261233

## TRANSPORTATION NOISE AND ITS CONTROL

To meet the growing need for transportation services, our means of mobility must be made quieter as well as cleaner. This paper is an outline summary on transportation noise--what it is, how it differs depending on source and distance, and what can be done to curtail or contain it. Subsonic and supersonic aircraft, highway traffic and rapid transit vehicles are discussed in detail as sources of noise. Measurements, propagation and residential noise levels are discussed in appendices.

Department of Transportation DOT P5630.1, June 1972, 7 Ref

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03 261278

## NOISE ENVIRONMENT OF URBAN AND SUBURBAN AREAS

Under the sponsorship of the Federal Housing Administration, the Acoustical Consulting firm of Bolt, Beranek and Newman, Inc. was contracted to conduct a series of studies on the subject and prepare the data contained in this guide. It identifies all significant noise sources, other than

aircraft, known to create disturbances within the home. It analyses the results of a social survey made to determine community responses to traffic noise. Noise reduction measurements recorded in three major cities as characteristic of typical urban noise criteria is also discussed. The intended objective of this guide is to provide FHA insuring offices as well as architects, builders, and homeowners a readily useable source of information dealing with the noise environment of our community. It does not in any way amend or supplant FHA's Minimum Property Standards. (Author)

Developed under the Technical Studies Program of the Federal Housing Administration, Department of Housing and Urban Development.

Bolt, Beranek and Newman, Incorporated Jan. 1967, 50 pp, 13 Fig, 4 Tab, 9 Ref, 2 App

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03 261289

## CATEGORY SCALING JUDGMENT TESTS ON MOTOR VEHICLE AND AIRCRAFT NOISE

Subjects were asked to rate on various adjective category scales the sounds produced by aircraft flyovers and motor vehicle drivebys. Recorded sounds were rated by college students and community residents at locations near a highway and two airports. The laboratory tests indicated that all of the category scales were similar in their relationship with acoustical measures, although, in general, the noisiness scale exhibited the highest correlation. The correlations between the noisiness scale and various acoustical measures for the laboratory and field tests were all about equal, with perceived noise level, calculated or estimated from N-level measurements, exhibiting the highest correlation, followed by loudness level and A-level. The lowest correlation was exhibited by overall sound pressure level. Both the laboratory and field results were in good agreement and indicated little difference in ratings vs level among various sound stimuli employed during the tests. Agreement was good with the results of other investigators at the highest levels, diverging at the more moderate levels. These comparisons indicate the influence of stimulus range on the magnitude and slope of the relationship between the subjective rating vs a physical noise measure. (Author)

Prepared for Federal Aviation Administration by Bolt, Beranek and Newman, Incorporated.

Pearsons, KS Horonjeff, Rgd  
 Bolt, Beranek and Newman, Incorporated Tech Rpt DS-67-8, 75 pp, 55 Fig, 16 Tab, 14 Ref, 4 App

Contract DOT-FA65WA-1260

ORDER FROM: Bolt, Beranek and Newman, Incorporated, 15808 Wyandotte Street, Van Nuys, California, 91406

03 261399

## NOISE POLLUTION AT AIRPORTS-A SERIOUS PROBLEM IN THE SEVENTIES

This paper explores the general area of noise pollution caused by the airplane. Noise control efforts by the air industry and the Federal government are reviewed. Efforts by individuals to control noise pollution and to seek damages when harmed by noise and noise control efforts by local and State governments decisions are covered. Focus is on the City of Burbank et al. v. Lockheed Air Terminal, Inc., et al. Supreme Court of the United States, No. 71-1637, May 14, 1973, which indicates that the job of managing the airspace lies with the FAA and that noise control procedures must arise from the FAA and not through local regulation.

Lynagh, PM *Transportation Law Journal* Vol. 6 No. 1, Jan. 1974, pp 31-42

03 291036

## THE CONTROL OF NOISE

This article describes the present legal measures in Great Britain against noise, the legal powers of local planning authorities to control noise, and the principles of physical planning against noise. The maximum permitted sound levels in urban and rural areas are mentioned together with their effect on airports, aircraft, traffic and traffic management methods of insulating buildings and houses, and their effectiveness in noise reduction are tabulated. /TRRL/

VulKan, GH (Greater London Council, UK) Dallman, JP  
(Government Printing Office) *Society of Environmental Engineers, Journal*  
of No. 53, June 1972, pp 29-32, 1 Fig., 4 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 202665)  
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## Chapter 4

# AIRPORT DEMAND AND FORECASTS

04 090622

### AIRPORT NOISE REDUCTION FORECAST

No Abstract.

Set includes PB-239 387 thru PB-239 388.

Wyle Laboratories Oct. 1974, 451 pp

ACKNOWLEDGMENT: NTIS

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PB-239386-SET/ST

04 090888

### AIR TRAFFIC CONGESTION AND CAPACITY (A BIBLIOGRAPHY WITH ABSTRACTS)

Present and predicted air traffic density and capacity, both en route and in airport environments, is analysed in these Government-sponsored research reports. (Contains 106 abstracts).

Habercom, GEJ

National Technical Information Service Report Apr. 1975, 111 pp

ACKNOWLEDGMENT: NTIS

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04 092261

### AIRPORT ACTIVITY STATISTICS OF CERTIFICATED ROUTE AIR CARRIERS, ISSUED SEMIANNUALLY, 12 MONTHS ENDED DECEMBER 31, 1974

Summary table include: Aircraft departures, enplaned revenue passengers, and enplaned revenue tons of cargo and mail (1) by type of operation, by type of service, by carrier group, and by air carrier, (2) by type of operation, by type of service, and by state and country, (3) aircraft departures, enplaned revenue passengers, and enplaned revenue tons of cargo and mail in total operations, all services at large air traffic hubs, (4) at medium air traffic hubs, and (5) at small air traffic hubs; Detailed Tables--(1) enplaned revenue passengers, enplaned revenue tons of cargo and mail, and air traffic hub classifications, by type of service, by community, and by carrier, and (2) aircraft departures scheduled and aircraft departures performed, by type of operation, by aircraft type, by community, and by carrier.

Civil Aeronautics Board \* 1974, 345p

ACKNOWLEDGMENT: NTIS

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AD-A014124/2ST

04 136851

### FORECAST OF LANDSIDE AIRPORT ACCESS TRAFFIC AT 211 MAJOR U. S. AIRPORTS TO 1990. VOLUME I. THE FORECASTS

Landside airport access traffic is forecast for 211 major U. S. airports for 1975, 1980, 1985, and 1990. The 1973 traffic is estimated. Aspects of access traffic forecast are average daily total vehicular volume, peak hour volume per lane of principal access roadway, congestion status, modal split (including auto, taxi/limousine, bus, rail, and other), and annual access traveller volume. The study uses existing data. A detailed description of the technical approach is presented in Volume II.

See also Volume 2, AD-A025 246.

Ellis, WW Booker, NC Feldstein, IS

Verve Research Corporation Final Rpt. FAA-RD-75-124-1, VR-19-5-Vol-1, Feb. 1976, 244 pp

Contract DOT-FA74WAI-449

ACKNOWLEDGMENT: NTIS

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AD-A025401/1ST

04 139614

### ELASTICITY OF AIR TRAVEL DEMAND WITH RESPECT TO AIRPORT ACCESS COST

This paper sets forth the hypothesis that air travel demand is elastic with respect to airport access costs and that the distance of an airport from the city it serves has an impact on the volume of passenger traffic at the airport. As a test case, Houston's traffic with 50 city pairs is analyzed before the

closing of Hobby Airport (23 miles from downtown). It was found that short-haul traffic (under 200 Miles) fell dramatically when passengers had to travel the longer distance to the new airport. Total trip cost (in 1968 constant dollars) is calculated for each pair, and the traffic loss for each city pair is estimated. From these figures, a range of elasticities is obtained. Applications for future airport planning are also discussed. /Author/

Bower, LL (Battelle Memorial Institute) *Transportation Research* Vol. 10 No. 3, Apr. 1976, pp 193-199, 2 Fig., 1 Tab., Refs.

ORDER FROM: ESL

04 143864

### SUMMARY REPORT OF THE ST. LOUIS AIRPORT INVESTIGATION- PHASE II

Based on forecasts of aviation activity presented in earlier reports under this contract, the Phase II investigation is a comparison of alternatives to meet the demand for air service in St. Louis. The study evaluated alternative transfer dates for initiation of air service from a proposed site near Columbia-Waterloo, Illinois, at 1985, 1990, 1995, and 2000. The evaluation considered economic and noneconomic impacts. Analyses were conducted of airport construction costs, airfield operations costs, airport access facilities costs, airport access travel costs, aircraft noise, air pollution, natural environment impacts, and community development and land use impacts. A financial evaluation was also conducted. A number of sensitivity analyses were also conducted to assist in comparing the alternatives. (Author)

See also AD-A026 765.

Haney, DG

Peat, Marwick, Mitchell and Company OST-TPI-40176-7, Nov. 1975, 47 pp

Contract DOT-OS-40176

ACKNOWLEDGMENT: NTIS

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AD-A027185/8ST

04 147239

### TECHNICAL BACKGROUND: INTERIM CRITERIA FOR PLANNING ROTARY-WING AIRCRAFT TRAFFIC PATTERNS, AND SITING NOISE-SENSITIVE LAND USES

This report presents interim criteria for locating rotary-wing aircraft traffic patterns and ingress and egress corridors into an airfield/heliport to avoid conflict with noise-sensitive land uses, and provides criteria for planners to site noise-sensitive land uses with respect to the established airfield/heliport and established flight corridors. These interim criteria are required because the exact Air Force technique for predicting fixed-wing aircraft noise cannot currently be used due to the unpredictability of helicopter flight patterns; these criteria are the basis for interim procedures established in a companion report, User Manual: Interim Procedure for Planning Rotary-Wing Aircraft Traffic Patterns and Siting Noise-Sensitive Land Uses (Construction Engineering Research Laboratory Interim Report N-10, 1976). (Author)

See also AD-A031 450.

Schomer, PD Homans, BL

Army Construction Engineering Research Laboratory, (DA-4-A762720-A-896) Intrm Rpt. CERL-IR-N-9, Sept. 1976, 17 pp

ACKNOWLEDGMENT: NTIS

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AD-A031449/2ST

04 150763

### AIRPORT ACTIVITY STATISTICS OF CERTIFICATED ROUTE AIR CARRIERS

This report furnishes airport activity of the Certificated Route Air Carriers. Included in the data contained in Table 6 are passenger enplanements, tons of enplaned freight, express, and mail. Both scheduled and non-scheduled service, and domestic and international operations are included. These data are shown by airport and carrier. Table 7 includes departures by airport, carrier and type of operation, and type of aircraft. (Author)

Civil Aeronautics Board Intrm Rpt. Dec. 1975, 323 pp

ACKNOWLEDGMENT: NTIS



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AD-A033279/1ST

04 154732

**IFR AIRCRAFT HANDLED FORECAST BY AIR ROUTE  
TRAFFIC CONTROL CENTER, FISCAL YEARS 1977-1988**

The report presents the forecasts of Instrument Flight Rule (IFR) aircraft handled by FAA air route traffic control centers (ARTCC). It serves as a base for the FAA planning and budget process in determining future requirements for facilities, equipment and manpower. The forecasts show that total aircraft handled will increase from 23.9 million in FY 1976 to 39.2 million in FY 1988. These national total numbers along with those for the intervening years are broken down by FAA region and by each air route traffic control center in this report.

Federal Aviation Administration FAA-AVP-76-13, Nov. 1976, 54 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD-A035204/7ST

04 155450

**FORECASTING DEMAND AT AIRPORTS**

Airport planning information needs are investigated. Three forecast types are defined: long range, planning, and operating. Each has different requirements for output, detail and accuracy. A flexible forecasting methodology is proposed and applied to make a long range forecast for Bangkok. This case study demonstrates some of the problems of forecasting and attempts to overcome them. Uncertainty about the future and each of data prevent accurate forecasts. These constraints cannot be eliminated or even appreciably reduced. Forecasts will remain inaccurate. Detail and the development of sophisticated techniques are less important than cost effectiveness and sensitivity analysis. The forecaster should select methods to fit the situation and overall methodology. Judgement is control to all methods. The forecaster should outline his judgement explicitly in assumptions and scenarios. The planner should design flexible facilities to accommodate the differences between forecast and actual demand.

Moore, HL, Jr  
Massachusetts Institute of Technology Sept. 1973, 262 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

04 155451

**FORECASTING AIRPORT TRAFFIC**

This paper focuses upon the practical translation of long-range national air traffic forecasts into local facility and service planning criteria which the author hopes will be useful to engineers faced with specific local airport planning and development problems. To bring the subject to life by a practical application to a real problem, the proposed reconstruction of Newark airport is used as a concrete illustration. Newark is, perhaps, a fairly typical example of an airport that has outlived its designed terminal capacity and must now be substantially rebuilt to meet its ultimate traffic demand within the limitation of its ultimate runway capacity.

From the book *Airport Economic Planning* by G.P. Howard.Johnson, NL (Port Authority of New York and New Jersey)  
Massachusetts Institute of Technology Press 1974, pp 210-222

ACKNOWLEDGMENT: Massachusetts Institute of Technology

04 155452

**FORECASTING TRAFFIC FOR AIRPORT DEVELOPMENT**

This paper is divided into three parts: 1. A discussion of the forecasting process in the FAA and its relation to planning efforts of the FAA; 2. A discussion of the methodologies and assumptions which have been used in developing FAA air traffic forecasts; 3. A summary presentation of FAA forecasts for 1973-1983 key indicators of aviation activity.

From the book *Airport Economic Planning* by G.P. Howard.Pulling, RW Guth, HJ (Federal Aviation Administration)  
Massachusetts Institute of Technology Press 1974, pp 65-81

ACKNOWLEDGMENT: Massachusetts Institute of Technology

04 155453

**MARKET RESEARCH AND FORECASTING FOR THE AIRPORT  
MARKET**

This paper describes in some detail how the Port of New York and New Jersey Authority has applied the findings of travel market surveys to some areas of air passenger forecasting.

From *Airport Economic Planning* by G.P. Howard.Howard, GP Augustinus, G (Port Authority of New York and New Jersey)  
Massachusetts Institute of Technology Press 1974, pp 109-127, 3 Tab.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

04 155535

**STUDY OF AIRCRAFT IN INTRAURBAN TRANSPORTATION  
SYSTEMS: SAN FRANCISCO BAY AREA**

The study examines the nine-county San Francisco Bay area in two time periods (1975-80 and 1985-90) as a scenario for analyzing the characteristics of an intraurban, commuter-oriented aircraft transportation system. Aircraft have dominated the long-haul passenger market for some time, but efforts to penetrate the very-short-haul intraurban market have met with only token success. Yet, the characteristics of an aircraft transportation system speed and flexibility are very much needed to solve the transportation ills of our major urban areas. In August 1967, The Boeing Company completed the "Study of Aircraft in Short-Haul Transportation Systems," reference 1. That study examined the use of VTOL STOL aircraft in short-range 150-400 mi-80-644 km intercity transportation systems, all of which had had some form of CTOL air service for some time. The results showed that both VTOL and STOL aircraft could be economically viable over those ranges. The present study of aircraft in intraurban transportation systems is concerned with ranges below those investigated in the previous study. This study will attempt to determine if the aircraft can contribute toward solving the transportation problems of major metropolitan areas and be economically viable in such an environment. The current method of providing for the increased transportation demands in our major cities is to build bigger freeways, add rapid transit (such as the Bay Area Rapid Transit), or both. With freeways becoming less and less popular with amateur and professional ecologists, public transportation systems are being looked on with more favor. Local and national subsidies are available in varying amounts. The flexibility inherent in an aircraft transportation system and its freedom from community-disrupting ground corridors offer some possible improvements over ground systems.

Boeing Company NASA CR-114347, Sept. 1971, 525 pp

ACKNOWLEDGMENT: Port Authority of New York and New Jersey

04 155545

**A FORECAST OF AIR TRAVEL AND AIRPORT AND AIRWAY  
USE IN 1980**

This procedure indicates the jet routes used, the mix of aircraft, trip length and number of passengers per flight. Route structures consistent with the growth of travel and its origin and destination distribution can be determined to assist airline planning and shed light on merger or route proposals that may come before the Civil Aeronautics Board. Any national totals can be obtained by simply aggregating over individual routes and airports. United States domestic passenger travel and commercial trunk airline traffic are discussed in this paper. In Section II, a function giving passenger demand for travel between cities is estimated with cross-sectional data. In Section III, a simple model of an airline is developed and its ability to predict flights in domestic city-pair markets is tested. In Section IV, these models are brought together to project passenger demand and airline service patterns. In the last section some rather surprising conclusions are presented.

DeVany, AS (Texas A&M University) Garges, EH (Center for Naval Analyses) *Transportation Research* Vol. 6 No. 1, Mar. 1972, pp 1-18ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

04 155566

**BIBLIOGRAPHY ON AIR TRAVEL AND ASSOCIATED GROUND  
TRANSPORTATION**

This bibliography is intended to provide background reading for a study performed by IDA for the Office of Research of the Urban Mass

Transportation Administration of the U.S. Department of Transportation. In keeping with the focus of the IDA Study, S-351, Intra-Airport Transportation systems: An Examination of Technology and Evaluation Methodology, a survey of documents and articles was made to help identify current data and studies relating to air travel demand projections, alternative airport configurations, flow patterns and rates, and available or potential ground transportation concepts, systems, and components. This bibliography covers the subject areas up to August 1969.

Kiernan, J  
Institute for Defense Analyses June 1970, 43 pp

ACKNOWLEDGMENT: Federal Aviation Administration Library

## 04 155574 UNCERTAINTY AND LONG-RANGE FORECASTING OF AIRPORTS

While it is noted that there is no master checklist of all variables that may affect individual airports, there are some elements common to all good airport forecasts: correlation analyses of relationships between traffic and basic socioeconomic indicators; quantitative projection of these indicators; and judgement. The various factors affecting correlation analyses for air passengers are listed. Good judgement is needed to select the best types and specific parameters of mathematical curves (the most common types are listed) to be used. Long-term growth trends in population, GNP, and electricity output by utilities for public use, and airline domestic and international passenger-miles in scheduled service are illustrated and discussed. The problem of discontinuities is discussed, as well as the positive and negative factors in the travel market. Comments are made on forecasting design parameters, and a strategy is suggested for coping with the uncertainty of the future.

Bluestone, DW *Airports International* No. 48, May 1975, pp 35-42

ACKNOWLEDGMENT: Federal Aviation Administration Library

## 04 155602 HOW GOOD ARE AIRPORT PLANNING FORECASTS?

This article which focusses on forecasts of passengers and related operations for air carriers (certificated, intra-state, third-level, and supplemental carriers) refers to the lack of user input to the FAA Circulars, comments on macro forecasts, traffic growth rates, and aircraft movements. It is noted that the Air Transportation Association (ATA) forecast covers rates and volumes annually through the year 2000 and is the result of a comprehensive update. This forecast can be used to compare individual airport growth rates and changes in share of U.S. traffic. It is pointed out that identifying and substantiating local variations is an important step toward minimizing disagreements over forecasts and minimizing the chance of error due to straight linear extrapolations of growth. ATA forecasts provide detail on 2 key elements affecting aircraft movement; aircraft size and load factor. Problems associated with the relationship between daily and peak hour aircraft movements are discussed, and a checklist is provided for testing the credibility of forecasts of aircraft passengers and aircraft operations.

Whitehead, KR (United Air Lines Incorporated) *Airport Services Management* Vol. 14 No. 10, Oct. 1973, pp 61-65

ACKNOWLEDGMENT: Federal Aviation Administration Library

## 04 155650 THE AIRPORT PERFORMANCE MODEL

This report describes the development of a model and companion data base for evaluating levels and qualities of service provided to the public by air carrier airports. The model is designed to translate changes in airport capabilities into public service via data describing the characteristics of demand at individual airports. The model is sensitive to airport saturation capacities, aircraft mix, time distribution of demand, airport weather, and data describing passenger movements such as load factor, through passenger, and transfer passenger descriptions.

Hiatt, D Gordon, S Olesen, JF  
Transportation Systems Center FAA-ASP-75-5, Apr. 1976, 204 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

## 04 155662 RESEARCH ON CONCEPT OF AN AIRPORT INDUSTRIAL CITY: FINAL REPORT

This report presents the results of a study performed under the sponsorship of the Connecticut Research Commission to develop the concept of an Airport/Industrial (A/I) City and examine some of its implications. Basically, this concept consists in locating a new large airport away from existing cities and utilizing the surrounding land for nonresidential purposes, primarily industry. This buffer zone serves to isolate the airport from the residential areas, while producing income for the area. The airport, the surrounding industrial developments, and the outlying residential areas would then form a new city. The objectives of the study were to (1) estimate the airport demand, (2) examine intermodal exchange concepts, (3) synthesize the results into a conceptual design, (4) perform an allocation of land area and estimate the employment opportunities, and (5) select an access system that ties the area together. Study conclusions are presented which relate to: air traffic potential; land use for industry and recreation; the population that the A/I city could support; and a demand actuated access system.

Hesse, JE  
United Aircraft Research Laboratories Apr. 1977, 87 pp

ACKNOWLEDGMENT: Air Transport Association of America Library

## 04 155718 SHORT-RUN TRANSPORT DEMAND AT A PROVINCIAL AIRPORT

Much effort has been directed to developing global forecasts of air transport demand, particularly by airline companies and professional bodies in the air transport industry, but detailed analysis of the characteristics of demand for air transport over specific routes has been less well researched, especially on routes operated from smaller airports. This paper sets forth some short-run demand estimates for a selection of air transport routes operated from Birmingham Airport. Although the analysis was confined to scheduled services operated from Birmingham, the results obtained have some interesting general implications for policy towards air transport. Price setting in other environments, and these pursued in the final section of the paper. The analysis was further confined to scheduled services operated by British European Airways, on which information was more readily available, and a theoretical framework easier to develop, than for non-scheduled operations. In addition, it is clear that, at the time of the analysis, revenue from year-round scheduled services was still much more important to airports like Birmingham than revenue from the predominantly seasonal non-scheduled operations.

Thompson, GF *Journal of Transport Economics and Policy* Vol. 8 No. 1, Jan. 1974, pp 70-81, 2 Tab., 15 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

## 04 155729 SURVEY PROGRAMS AT PORT AUTHORITY AIRPORTS

A direct study of patrons has been accomplished in periodic surveys conducted among domestic and overseas air passengers using Port Authority airports over the past 20 years. Some of the findings of these surveys are described in order to indicate the significance of this information source. Some sampling methods are briefly reviewed, and the planning and carrying out of the surveys are described. The essential dimensions of the population being surveyed are outlined, and it is noted that one of the most significant factors in air terminal design that is not revealed by ordinary traffic statistics is transfer activity. Surveys of air passengers yield estimates of all transfer activity. The surveys described here also illustrate the necessity for studying each airport separately as well as collectively. The demand for private car parking space at the airports and the proportion of resident passengers are discussed. The importance is noted of the distinction between business and personal travel, and of the frequency of travel. Aspects such as family income data, the duration of a U.S. resident's transatlantic trip and the age composition of the market are discussed. The problem of designing effective inflight surveys is reviewed in some detail.

From Airport Economic Planning by G.P. Howard.

Hurst, F (Port Authority of New York and New Jersey)  
Massachusetts Institute of Technology Press 1974, pp 41-64

ACKNOWLEDGMENT: Massachusetts Institute of Technology

04 155745

**AIR CARGO AND AIRPORTS IN THE FUTURE**

The continuing growth of the air cargo volume makes it necessary to take the impact of air freight on airport operations into account in all planning activities which are related to the establishment of new airports on the farther development of existing airports. The consideration problem with respect to cargo developments on the airport is considered and the factors which will influence the location of air cargo centers on the airport property are examined. The elements which affect the size of the cargo area are discussed. Attention is also given to some of the more important factors which will influence the design of the cargo areas in the future.

Simpson, KH (Department of Transport, Canada) *Canadian Aeronautics and Space Journal* Vol. 21 No. 6, Dec. 1975, pp 384-387

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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04 155833

**NORTHEASTERN ILLINOIS 1995 AIRPORT SYSTEM IMPLEMENTATION STUDY/PRIORITY STATEMENT**

A recommended 1995 airport system plan for the eight county Chicago-Northwest Indiana standard consolidated area was presented. Four alternative systems and their interrelationship with alternative highway, transit, and freight transportation plans were examined.

Chicago Area Transportation Study No Date, 124 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
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04 155871

**THE MONTEREY PENINSULA AIRPORT IN THE 1970'S AND 1980'S--A DEMAND FORECAST**

The Monterey Peninsula Airport is modeled as a three component (airside, terminal, and streetside) system and forecasts of demand and utilization for each component are developed through use of linear and log linear regression techniques. Specifically, forecasts for general aviation operations, airline passenger enplanements and passenger associated visitors, the number of automobiles utilizing the roadway during the peak hour (two scheduled airline departures and two scheduled airline arrivals within the same hour) and associated parking space requirements have been made for the years 1973, 1974, 1975, 1980, and 1985.

Maples, AL  
Naval Postgraduate School MS Thesis 1974, 121 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

04 155879

**FRANKFURT'S SCHEDULED TRAFFIC MATHEMATICALLY ANALYZED**

As in many other fields, an increasing application of the mathematical approach is also discernible in the transport area. Complex processes are reproduced in suitable mathematical models and run through the computer. An analysis is made of the distribution of takeoffs and landings at Frankfurt Rhein-Main Airport on a peak day in 1973, as a contribution to the analysis of the operating loads of busy major airports with parallel runway systems.

*Airport Forum* Vol. 4 No. 1, Mar. 1974, pp -16, 4 Fig., 5 Tab.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

04 155890

**PROBLEMS AND PROSPECTS IN THE INTRODUCTION OF AIRLINE SERVICE TO SMALL COMMUNITIES**

Norontair, the local air carrier operating in Northern Ontario, was established by the Government of Ontario on an experimental basis in October 1971. Certain aspects of the operation of Norontair are discussed including local airport problems, airport development problems, and the market for local and feeder air service.

Wallace, DM (Ontario Northland Transportation Commission) *Canadian Aeronautics and Space Journal* Vol. 23 No. 3, May 1977, pp 145-150

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

04 155891

**REMOTE AIR SERVICES DEFINING SOCIAL NEED**

During 1973-74, the Arctic Transportation Agency of Transport Canada conducted a survey of air services in the Yukon and Northwest Territories. User opinion was collected by questionnaire and public meetings were held at 22 select locations. Results were generalized to form the basis for defining social need in future airport planning and to assist policy formulation for local air service carriers.

Courtney, JL (Department of Transport, Canada) *Canadian Aeronautics and Space Journal* Vol. 23 No. 3, May 1977, pp 164-170

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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04 155897

**AIRPORTS FOR THE 80'S**

Anticipated development and growth of air transport in the near future is examined in relation to the planning and design of airports for the 1980's. Papers examine differences between present and future commercial aircraft, the effects of technological development on international air transport, changes in the European air transport pattern, terminal planning for improved passenger and baggage movement, special development problems envisioned for Maplin Airport, social and economic consequences of airport operation, and the contrasts in national airport planning as occasioned by participation of central governments in different countries.

Proceedings of the 4th World Airports Conference, London, England, 3-5 April, 1973.

Institution of Civil Engineers 1973, 210 pp

ACKNOWLEDGMENT: International Aerospace Abstracts

04 155901

**GETTING THE MOST FROM EXISTING AIRPORTS**

The background to the development of existing airports to meet the demands for an traffic up to about 1990 is discussed, taking the problems of the London area as an example. It is shown that with good planning and vigorous action it should be possible to develop London's existing airports to cope with traffic demands for the foreseeable future. Due to the trend of using large aircraft, the primary requirement is for more and better passenger terminals at existing airports.

From the Challenging Future, Proceedings of the 5th World Airports Conference, Brighton, England 5-7 May 1976.

Masefield, PG (British Caledonian Airways, Limited)  
Institution of Civil Engineers Proceeding 1976, 17 pp

ACKNOWLEDGMENT: International Aerospace Abstracts

04 155908

**DEMANDS FOR AIR TRANSPORT-1980-1990**

Air transport in the 80's will be characterized by traffic volumes many times greater than those of today. In meeting this demand, the resolution of the economic and political aspects of the general problem will present greater difficulties than resolving the technical aspects. World airline passenger traffic should double by 1980 and increase six-fold by 1990. Scheduled air freight by 1980 will be 3.5 times, and by 1990 ten times, present volumes. Industrial countries will continue to predominate air passenger and freight traffic. Today's turbojet fleet of 4000 will expand to about 6000 by the early 80's and some aircraft may have over 1000 seats. Cargo capacity will increase proportionately. Congestion of airport runways, passenger and cargo terminals, inspection and ground transport facilities is expected to increase, as will demand for additional and improved airport systems.

From Airports for the 80's. Proceedings of the 4th World Airport Conference, London, England, 3-5 April 1973.

Hammarskjold, K (International Air Transport Association)  
Institution of Civil Engineers Proceeding 1973

ACKNOWLEDGMENT: International Aerospace Abstracts

04 158214

**THE AIRPORT AND THE AIR TRANSPORT CRISIS [L'Aeroporto e la crisi del trasporto aereo]**

I.C.A.O. (International Civil Aviation Organisation) statistics are presented, which show that the total volume of world air traffic (including passenger,



freight and post) increased by only 2 per cent in 1975 with regard to 1974. The statistics are based on data supplied by 131 member countries and states, and the overall 2 per cent increase is an average derived from a 3 per cent increase in passenger traffic, a 1 per cent decrease in freight traffic, and A stable position in postal traffic. The article discusses the difficulties of airport location (proximity to urban areas, ground traffic facilities and noise control) and reference is made to the time lapse between decision making and the commencement of building. Finally, some promising aspects of marine and off-shore airports are discussed. [Italian]

Dassina *Strade Analytic* No. 5, Sept. 1976, pp 365-75, 1 Fig., 3 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 225330)

ORDER FROM: Permanent International Assoc of Road Congresses, Via Andreani 4, Milan, Italy

## 04 158216

### DEMAND FORECASTING IN TOURISM

The aims of this book are to explain the fundamental theoretical and practical bases of the principal methods used to analyse and forecast demand and, secondly, to examine the state of the art in the practical application of these techniques. The main emphasis is given to analytical techniques especially those with an economic basis. The concept of demand is treated in outline in chapter 1 and A general description of the main forecasting techniques is provided in chapter 2. Several of the principal methods are selected for more detailed examination in subsequent chapters. Chapter 3 deals with the theoretical and statistical background of some of the more rigorous techniques. Chapters 4 and 5 are concerned with recent applications of these approaches and chapter 6 provides A description of delphi models and their use in research. A comprehensive annotated bibliography of recent work is included.

Archer, BH

Wales University Press Monograph No. 9, 1976, 123 pp, 14 Fig., 1 Tab., 65 Ref.

ACKNOWLEDGMENT: TRRL (IRRD 224676)

ORDER FROM: Wales University Press, University College of North Wales, Bangor, Wales

## 04 159709

### INTERACTIVE COMPUTING TECHNIQUES IN AIRPORT MASTER PLANNING

Fully implemented interactive computer techniques were employed at Battelle's columbus Laboratories during each of 2 site specific airport case studies for the Federal Aviation administration: Chicago's Midway (1974) and New York's La Guardia (1975). The runway demand forecasts used during these contract studies varied widely by time of day and by season of the year. These time-varying patterns created a need to estimate corresponding aircraft runway delays and aircraft runway queue lengths. These airport airside level-of-service estimates were computed by using a set of simultaneous differential equations derived from classical nonstationary queuing theory. Many equations derived from classical nonstationary queuing theory. Many quantitative operating variables have to be accounted for during a computer analysis of this type. Depending on the purpose of the analysis, certain categories of variables may be independent input variables in one situation and dependent output variables in another situation. A high degree of computational and operational computer flexibility is therefore required during such an analysis. This paper highlights the interactive computer techniques developed and used during the 2 airport case studies. A typical application is also presented to illustrate the scope and flexibility of these advanced techniques. The paper concludes with a summary of experience gained with the described computer program and the interactive programming techniques employed to significant advantage. /Author/

Rogers, RA (Exxon International Incorporated) Bruce, WC, Jr (Battelle Columbus Laboratories) *Transportation Research Record* No. 588, 1976, pp 6-10, 2 Fig., 2 Tab., 9 Ref.

ORDER FROM: TRB Publications Off

## 04 163484

### AIR TRAFFIC FORECASTING METHODS FOR AIRPORT PLANNING

Air traffic forecasting methods are classified under three general heading estimate method, trend analysis (in the broad sense), and forecasts based on

models. The time period covered by the forecast, the extent of the field under study, and the level of detail required from a different axis for classification. The mean variation method, the sliding averages method, and the trend functions method are subsumed under trend analysis (based on studies of time series). Analysis of growth rates for a given time series is handled by the mean variation method. Models dealing with functional relationships between traffic volume and various influencing factors include gravitational models (using traffic potentials), traffic generation models, modal split models, and elasticity models. Best areas of applications and applicable restrictions for the methods and models are indicated.

Henning, D *Airport Forum* Vol. 6 No. 2, Apr. 1976, 7 pp

ACKNOWLEDGMENT: International Aerospace Abstracts

## 04 163514

### SAINT LOUIS AVIATION FORECAST STUDY: EXECUTIVE SUMMARY

Forecasts of aviation activity are developed for the St. Louis region to the year 2000. Forecasts are presented on scheduled air carrier, commuter, general aviation, and other types of aviation activity for Lambert-St. Louis. General aviation forecasts of regionwide activity are also reported. Detailed forecasts of peak hour operations, VFR/IFR operations, and day/night operations are developed. Airport access traffic is also forecast. Sensitivity analyses are included on a number of future uncertainties. In general, the forecasts show significantly lower levels of growth than have been predicted in recent studies conducted for the airport authorities in St. Louis.

Haney, DC

Peat, Marwick, Mitchell and Company DOT-OS-40176, Sept. 1974, 20 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration

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PB-239055/7

## 04 163521

### SAINT LOUIS AVIATION FORECAST STUDY--FINAL REPORT

The following topics are reported (1) analysis and forecast of population and economic activity in St. Louis; (2) summary of historical aviation activity; (3) air carrier forecasts; (4) nonscheduled, charter, and international operations forecasts; (5) commuter air service forecasts; (6) military aviation forecasts; (7) analysis and forecast of general aviation activity; (8) detailed aircraft operations forecast; (9) ground traffic forecasts; and (10) sensitivity analyses.

Haney, DC

Peat, Marwick, Mitchell and Company DOT-OS-40176, Sept. 1974, 122 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration

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PB-239056/5

## 04 163522

### SAINT LOUIS AVIATION FORECAST STUDY: TECHNICAL SUPPLEMENT

This technical supplement includes input data and detailed tabulations from the airport ground access analysis made in connection with forecasts of aviation activity pertinent to the St. Louis airport problem dated October, 1974.

Haney, DG

Peat, Marwick, Mitchell and Company DOT-OS-40176, Sept. 1974, 323 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration

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PB-239058/1

## 04 163523

### SAINT LOUIS AVIATION FORECAST STUDY--REVIEW OF PRIOR FORECASTS

Forecast methodologies are described, and an overview of existing forecasts as well as a detailed review of existing forecasts are presented.

Haney, DG

Peat, Marwick, Mitchell and Company DOT-OS-40176, Sept. 1974, 122 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
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PB-239057/3

04 240712

**DESIGN DEVELOPMENT OF MONTGOMERY COUNTY  
AIRPORT**

the report begins with an overall forecast of aircraft operations and patronage in the washington-baltimore area. Projections through 1985 are detailed along with specific data on operations in Montgomery county. The report also examines general economic and consumer benefits to be yielded by planned airport development. The physical plant is evaluated to determine the extent of necessary long-range development. Air space is examined with reference to obstructions on the approaches and their distance from those of other area facilities, and economic aspects of the development proposal are assessed. Community impacts and construction costs are also discussed briefly. The report concludes with recommendations for long-range development of Montgomery county airport. These are advanced with general reference to facilities and shortcomings of the existing complex. A two-phase program is outlined in detail. The author gives particular attention to conversion of the present runway complex to precision standards. Detailed maps and designs for airport development are appended to supplement the textual material. /UMTA/

Kim, WI

Consortium of Universities No. DC-URT-3, June 1971

ACKNOWLEDGMENT: UMTA

04 291008

**FORECASTS OF AIR TRAFFIC AND CAPACITY AT AIRPORTS  
IN THE LONDON AREA**

Forecasts of air traffic and capacity at airports in the London area up to 1985 are reviewed. Attention is drawn to the need for further work to be done on the possible diversion of air traffic from the London area to regional airports, and for greater attention to be paid to the constraints on airport use imposed by terminal and handling capacity and surface access, as well as runway capacity. The report is divided into the following sections: historical backgrounds; general considerations; estimates of passenger and freight traffic in 1980 and 1985; traffic at Luton, Stansted and Southend; effects of the channel tunnel; airport capacity; runway capacity; airport capacity: ground area capacity; airport capacity: other capacity restraints; uncertainties and margins of error in the forecasts; the balance between demand and capacity.

Civil Aviation Authority R&D Rpt. May 1973, 63 pp, Tabs.

ACKNOWLEDGMENT: TRRL (IRRD 400002)

## Chapter 5

# AIRPORT MANAGEMENT, REGULATION, AND POLICY

05 084118

### METHODOLOGY OF DEVELOPING AND GAINING ACCEPTANCE OF REGULATIONS FOR LAND DEVELOPMENT NEAR A MAJOR AIRPORT

This paper discusses the steps followed in developing regulations for land development near the Dallas-Fort Worth Airport. The regulations embodied technical, sociological, legal and political aspects, and were developed by the North Central Texas Council of Governments in cooperation with the City of Irving. They are considered to be a model for other cities also affected by the airport, but in order to apply the regulations to a particular project, it is necessary to analyze the situation according to certain steps that are presented in this paper.

Presented at the International Conference on Noise Control Engineering held in Washington, D.C., September 30-October 2, 1974.

Randorff, JE (Joiner, Palton-Rose, Incorporated)  
Institute of Noise Control Engineering 1974, pp 277-282

ORDER FROM: Noise/News, P.O. Box 1758, Poughkeepsie, New York, 12601

05 090320

### TERMINAL AREA FORECAST, 1976-1986

This document presents forecasts of key aviation activity measures for fiscal years 1976, 1977, 1978, 1981, and 1986 for 808 airports, RAPCON's, and RATCC's. The forecasts are prepared to meet the needs of planning personnel concerned with future traffic levels at these facilities. The airports selected for inclusion in this publication met at least one of the following criteria: Existing tower, candidate for a tower, currently receiving or forecast to receive certificated route air carrier or air taxi service, and any general aviation airport which will exceed 60,000 itinerant and/or 100,000 total operations annually by 1977. The report is organized by FAA region and within each region by state.

Federal Aviation Administration Sept. 1974, 296p

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

AD/A-006504/SST

05 099284

### TRANSPORTATION FACILITIES WORKSHOP: PASSENGER, FREIGHT AND PARKING

Papers and reports presented at the three-day workshop on Transportation Facilities are published here. The papers which examine policies in conflict, present the government and industry perspectives on the subject of transportation, energy and the environment. The workshop papers cover transit station planning and design; the freight industry response to the transportation energy crisis; transportation control plans and their impacts upon urban parking; air terminal planning and design; freight consolidation; and the development of parking programs for tomorrow's environment.

The Transportation Facilities Workshop was held in New York from May 22-24, 1974. Co-sponsored by the American Society of Civil Engineers, Carnegie-Mellon University, Transportation Research Institute and the Metropolitan Association of Urban Designers and Environmental Planners.

American Society of Civil Engineers 1975, 558 pp

ORDER FROM: ASCE

05 131166

### AIRPORT LANDSIDE CAPACITY: ROLE OF MANAGEMENT

This paper isolates and examines in some detail the role airport management should play in acquiring and maintaining adequate levels of airport landside capacity. Recognizing that technical standards are both pervasive and desirable, it postulates that, although certain technical standards exist for providing landside capacity increases, they should not be used without careful management supervision and judgment and may not be used at all. The paper proceeds to examine why a balance between airside and landside capacity is important and analyzes several specific managerial elements that should be brought to bear on each prospective capacity improvement. It shows the varying interrelations of the elements, discusses the importance of local managerial talent and judgment processes (particularly as they relate to weighting the management elements on a situational basis and the application of cost-effectiveness techniques), identifies the barriers that tend to inhibit greater managerial effectiveness, and examines the methods by

which management inputs may be improved. Several areas of research are suggested. /Author/

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

Michael, RS (Denver Stapleton International Airport) *Transportation Research Board Special Reports* No. 159, 1975, pp 127-142, 2 Ref.

ORDER FROM: TRB Publications Off

05 131170

### REGULATORY CONSTRAINTS AND IMPACTS ON AIRPORT LANDSIDE CAPACITY

The regulatory authorities and their regulatory power are enumerated. The extent to which the regulatory powers directly or indirectly impact on airport landside capacity is then identified and investigated. The role of environmental legislation in an expansion or new airport context is shown to be quite important. Likewise, the lack of the control of the Civil Aeronautics Board over scheduling and equipment deployment is shown to be a major influence on airport landside capacity. Few of the impacts are shown to be direct. A host of indirect impacts of varying degrees of intensity exist. The paper suggests that a systems analysis of the benefits and costs of the regulations be undertaken. /Author/

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

Allen, WB (Pennsylvania University, Philadelphia) *Transportation Research Board Special Reports* No. 159, 1975, pp 174-188, 2 Fig., 3 Tab., 17 Ref.

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05 132286

### STRATEGIES FOR URBAN NOISE ABATEMENT: AN OVERVIEW

This report examines the levels of action, national and international, at which administrative and regulatory measures can be taken (1) to reduce noise at source (development of new products, setting up of standards for products in use, noise-related landing charges on aircraft, imposition of limits for noise from fixed sources), and (2) to reduce exposure to noise (isolation of noise sources, planning and noise abatement, routing and design of new roads, compensation, regulation of air and road traffic). Suggestions are put forward for the development of A rational noise abatement programme, and the allocation of tasks at local, national and international level is discussed. /TRRL/

Organization for Economic Cooperation and Devel R&D Rpt. 1975, 35 pp, 2 Tab., Refs.

ACKNOWLEDGMENT: TRRL (IRRD-216284)

ORDER FROM: OECD Publications Center, 1750 Pennsylvania Avenue, NW, R1207, Washington, D.C., 20006

05 143742

### TOWER AIRPORT STATISTICS HANDBOOK. CALENDAR YEAR 1974

During the calendar year 1974, daily aircraft activity was reported at 402 airports that had control towers operated by the Federal Aviation Administration. The purpose of this report was to use a package of computer programs to perform statistical analyses on six different types of daily operations as reported on FAA Form 7230-1, Airport Traffic Record. The output of the computer programs displays specific statistics in tabular and graphical format. The tabular statistics include means, standard deviations and peak occurrences computed for individual airports as well as various multiple airport groupings. Frequency distribution histograms and time curves are presented in a graphical format for the entire nationwide set of airports. (Author)

Hager, P Hobbs, R Jindia, G Wanderer, D  
Systems Consultants, Incorporated Final Rpt. FAA-AVP-76-3,  
SCI-2127, Jan. 1976, 560 pp

Contract DOT-FA76WA-3755

ACKNOWLEDGMENT: NTIS



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AD-A027840/8ST

05 145882

**A STUDY OF MONITORING REQUIRED IN REGULATION OF AIRPORT NOISE. VOLUME I**

The Environmental Protection Agency has under way a study of an airport noise regulation to establish a mechanism for limiting the noise exposure in communities around airports. The regulation may take many forms, but will include the options of quieting the source, modifying the airport operational plan, and land use remedies. The purpose of this study is to characterize, in depth, the many facets of monitoring that might be utilized in the implementation of an airport noise regulation.

Hydrospace-Challenger, Incorporated, Environmental Protection Agency  
Sept. 1974, 82 pp

Contract EPA-68-01-2686

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-257714/6ST

05 147030

**AN INVESTIGATIVE STUDY OF THE CALIFORNIA EXPERIENCE IN AIRPORT NOISE REGULATION**

This document constitutes the final report to the U.S. Environmental Protection Agency as an independent, "outsider" investigation and appraisal by individuals with no prior involvement in the California experience in airport noise regulation. The work performed was conceived and carried out primarily as a field study by a team of seven law students from the University of California at Davis.

Dunning, HC  
California University, Davis, Environmental Protection Agency Final Rpt.  
June 1975, 119 pp

Contract EPA-68-01-2645

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

PB-259458/8ST

05 155454

**AIRPORT NOISE REGULATION-BURBANK, ARRON, AND AIR TRANSPORT**

A review of decisions in lawsuits concerning the exercise of regulatory powers over aircraft noise is presented. Decisions resulting from a series of court tests have failed to provide unequivocal guidelines for the extent to which a municipality can control runway use, flight paths over densely populated areas, or operational procedures. A municipal proprietor can monitor airport noise but cannot sanction excessive noise emissions. The principal basis for past decisions has been pre-emption of control over airspace by the federal government. It is recommended that the legality of municipal regulations for noise control be established in the future by determination of the presence or absence of conflict with federal regulations. Alternatively, it has been suggested that new federal regulations be developed with participation of the airport operator in the preparation of noise profiles and constraints for each airport.

Wanen, ML *Environmental Affairs* Vol. 5 No. 1, Dec. 1976, pp 97-120

ACKNOWLEDGMENT: Massachusetts Institute of Technology

05 155467

**AIRPORT SYSTEMS PLANNING**

This book suggests how we can obtain reasonable strategies for the development of an airport system, and it provides a planning guide for all those concerned about airports. The focus is on the policy issues: How do we frame the problem? How do we investigate the possibilities? What kind of results can we expect? Key topics of discussion include: the inescapable uncertainties of forecasting and procedures for dealing with reality; the effects of competition between airports, as well as with other modes of transport; the problem of providing access to airports fairly and economically; the design of airport terminals to provide the right amount of capacity and service to all the different kinds of users; the economic and environmental benefits and costs of airports, and how they should be distributed. An

important chapter also indicates how prevailing values of society shape the choices we make, and how different solutions are right for different regions in countries.

de Neufville, R  
Massachusetts Institute of Technology Press 1976, 201 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

05 155509

**PROBLEMS OF MEDIUM SIZED AIRPORTS**

Summaries are presented of papers on finance, economic management and terminal design. The paper on finance reviews the various sources of revenue, available to an airport and the different categories of cost and concludes that capital investment should be financed by loans accompanied by the annuity method of depreciation. A paper on economics presented a step-by-step guide to the critical processes needed in order to bring about a review of the management system. The art of extending a terminal without interrupting the flow of traffic too greatly is described in another paper which used the Marseilles/Marignane airport as illustration.

*Airports International* No. 28, July 1973, pp 16-17

ACKNOWLEDGMENT: Massachusetts Institute of Technology

05 155513

**AIRCRAFT NOISE AND AIRPORT GROWTH**

Alleviation of aircraft noise continues to be one of the major technological challenges for air transportation. Unfortunately there is no comprehensive plan which encompasses Federal, State and local levels of government and the many segments of the aviation industry-for achieving such alleviation. Similarly, there is no one governmental or private body which has overall responsibility for the problem. The political, legal, economic, and technical factors which are an inherent part of the problem all but present one group from having total responsibility, and an efficacious plan from being formulated and implemented. This paper expands on these points, and presents the Department's policy and program for aircraft and community noise compatibility.

Proceedings of the 13th Annual Meeting, Transportation Research Forum, 1972.

Paullin, RL (Office of the Secretary of Transportation)  
Cross (Richard B) Company Conf Proc 1972, pp 413-418

ACKNOWLEDGMENT: Massachusetts Institute of Technology

05 155542

**NATO CONFERENCE: THE APPLICATION OF OPERATIONAL RESEARCH TO TRANSPORT PROBLEMS**

The conference papers covered a wide range of transportation subjects, involving both military and civilian problems, with many of the papers presenting empirical data and related analyses. The wide-reaching examination of transportation, with an emphasis on empirical content, was a major objective of the conference program. Sessions included selected multimodal studies, major transport problem areas, system design, scheduling and routing role of computers in transport management and planning, assessment of technological advances, future transport operational research needs, contributions to selection of infrastructure and interplay between civilian and military transport.

Geisler, MA (North Atlantic Treaty Organization)  
Western Periodicals Company 1972, 503 pp

ACKNOWLEDGMENT: Port Authority of New York and New Jersey

05 155608

**METROPOLITAN AIRCRAFT NOISE ABATEMENT POLICY STUDY; JOHN F. KENNEDY INTERNATIONAL AIRPORT, NEW YORK**

The Tri-State Transportation Commission, under contract to the U.S. Department of Housing and Urban Development (HUD), has prepared this report as part of the Metropolitan Aircraft Noise Abatement Policy Studies (MANAPS) at four airports in different cities. This report considers alternative measures, or combinations of measures, to provide relief from aircraft noise in affected communities around John F. Kennedy International Airport, and offers recommendations for reducing aircraft-noise

problems. The Commission studied present land use, local development policies and codes, sound insulations of structures, redevelopment, future land-use alternatives, legal aspects and airport operations. Alternative methods of reducing noise at the source were furnished by the Federal Aviation Administration (FAA), U.S. Department of Transportation (DOT). Costs are estimated for the alternative procedures considered.

Tri-State Transportation Commission 1970, 124 pp

ACKNOWLEDGMENT: Federal Aviation Administration Library

05 155609

## METROPOLITAN AIRCRAFT NOISE ABATEMENT POLICY STUDY-CAPE KENNEDY REGIONAL AIRPORT, MELBOURNE, FLORIDA. TECHNICAL REPORT

This report is an analysis of the relationship between noise generated by aircraft operations and the use of affected land surrounding the John F. Kennedy Regional Airport in Melbourne, Florida. It includes a presentation of current land use information and the prospects for change. Proposals have been developed to encourage and enable the local governments involved to achieve compatible development through cooperative intergovernmental measures: comprehensive planning, capital improvement programming, mapping, zoning, annexation, land acquisition. The ecological impact is considered in a separate section.

East Central Florida Regional Planning Council HUD/DOT IANAP-71-2, 118 pp

ACKNOWLEDGMENT: Federal Aviation Administration Library

05 155679

## GROWING CONCERN IN AVIATION WITH COSTS AND BENEFITS

This article reports on ICAS'S Air 8th Navigation Conference held in Montreal in 1974. Four hundred airport experts from seventy-five different countries gathered to discuss the major tasks and problems involved in planning, constructing and operating commercial airports runways, taxiways, fog disposal, lighting aids, fire and rescue services, safety, and environmental questions were the major topics of concern at this conference, and this article sums up the more important points that were said on each of these topics.

Grosch, RF (Berliner Flughafen GmbH) *Airport Forum* No. 2, June 1974, pp 54-62

ACKNOWLEDGMENT: Massachusetts Institute of Technology

05 155694

## THE ALLOCATION OF AIRPORT CAPACITY WITH EMPHASIS ON ENVIRONMENTAL QUALITY

In this piece we provide an airport administration structure which is sensitive and amenable to control of today's problems. This structuring is the output of a nonlinear programming, constrained behavioral study of airport operation. By directly imposing noise, air pollution, and capacity constraints on the operation of a loosely modeled airport behavior pattern, we are able to infer an appropriate, functional administration structure for contemporary airport management. Utilizing nonlinear decomposition procedures we present a complete communication charting of an airport framework which is capable of efficient enforcement of environmental and capacity standards.

Ferrar, TA (Pennsylvania State University, University Park) *Transportation Research* Vol. 8 No. 3, Aug. 1974, pp 163-169, 9 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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05 155726

## HOW TO MEASURE THE VALUE OF YOUR AIRPORT

An "Airport Economic Impact Study" technique which was pioneered with major airports serving air carriers is described. Depending upon enthusiasm and resources, a general aviation airport can adapt the idea. Basically, the study consists of a survey of all the individuals and businesses deriving an economic benefit from the airport, a compilation of their responses, and a publication of the results. Great care should go into preparing the list of those to be surveyed and the questions to be asked. Concepts to be kept in mind while constructing the study are the roles of an airport as an employer,

a taxpayer, a purchaser of local goods and services, a lure to new industries, a benefit for current businesses, and a stimulus to travel. The basis for the list of those to be surveyed will include airport management, airport employees, airport users (home-based private and corporate operators, air taxis, commuter airlines, non-scheduled transient aircraft, airport-related businesses), local economic development organizations, U.S. Postal Service (for airmail figures), and others who receive or generate community revenue through the airport. Sample questions which may be asked are listed and discussed.

*Airport Services Management* Vol. 16 No. 10, No Date, pp 26-28

ACKNOWLEDGMENT: Massachusetts Institute of Technology

05 155746

## MANAGEMENT FINANCIAL CONTROL REPORTING SYSTEM

The Management Financial Control System (MFCS) is designed to provide the director and operating management with quarterly reports that would enable them to determine those specific revenue producing facilities of the airports where net revenue production was less than the minimum standards established by Departmental Port Authority policy. The first step in the development of the MFCS was the renumbering of the airport's cost centers into a codified system that would allow for a more systematic evaluation. The management control groups were sub-classified into "management centers." The management control groups and cost centers are listed, the distribution of indirect or general expenses are discussed and examples are cited. Some of the components of the "Summary Financial Statement by Airport" are noted. This statement provides management with a ready relationship of revenues and expenses for assessing effectiveness in achieving a planned operating margin and in determining the major overall results on a consolidated basis other statements--"The Revenue Margin by Management Center" and "Facility Margin and the Field Unit Expenses by Management Center" are also discussed.

Volume II of NASA Workshop on Airline Systems Analysis.

Buchbinder, A (Port Authority of New York and New Jersey)  
Massachusetts Institute of Technology June 1972, 16 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

05 155747

## AIRPORT MANAGEMENT AND OPERATIONS

This practical guide which will help in standardizing airport operations, covers many aspects from basic accounting to safety procedures. Airport administration concepts such as the airport board/commission/authority are defined and related legislation is discussed. Operational functions are listed and discussed in detail. The method of control of parking areas, parking permits and parking regulations are reviewed. Other aspects covered here include: airport traffic rules, the public address system, aircraft clearance lights, ramp areas, parking and storage of aircraft in hangars, scheduled air carrier operations, airport approved vehicle requirements, self-propelled aircraft energizers, and trash control and removal. The installation and reporting of air conditioning units, the operation of baggage, freight and carts, and the marking and identification of servicing and maintenance equipment are also covered.

Campbell, GE  
Claitor's Publishing Division 1972

05 155758

## TEMPELHOF-STORY OF A CROSSROADS OF THE AIR

West Berlin's central airport closed to civil aviation on September 1, 1975. The uniqueness of this airport is related to its location within the heart of a densely populated metropolis. At an early stage of Berlin's urban development the territory in question had been set aside as a military exercise and parade ground. After the First World War, it was decided to make the area available as an airport. The history of the Tempelhof Airport which, for some time, was to occupy the first place among the European airports, is discussed.

Conin, H *Airport Forum* Vol. 5 No. 4, July 1975, 3 pp

05 155759

**AIRPORT JET FUEL HANDLING AND QUALITY CONTROL**

The ability to handle large volumes of jet fuel at a modern airport and maintain a high degree of purity requires an integrated quality control program. The adverse effects of contaminants on the aircraft systems are described to show the need for planned monitoring of the full handling systems. Methods for detecting the various fuel contaminants are described along with the effects of the contaminants on dispensing equipment and storage facilities. Methods for removing and eliminating contaminants and the equipment needed are described. The paper shows how only clean, water-free fuel can be delivered to the aircraft.

Quigg, LC (Lockheed Aircraft Corporation) Siddons, JK (American Airlines, Incorporated)

Society of Automotive Engineers SAE 760542, May 1976, 37 pp

ACKNOWLEDGMENT: International Aerospace Abstracts

ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-36609

05 155769

**PHYSICAL AND TECHNICAL ASPECTS OF THE AIRCRAFT NOISE ACT**

In March 1971, the Aircraft Noise Act providing protection from aircraft noise was passed in the Federal Republic of Germany. The new law is concerned with the creation of noise protection areas around the airports. The boundaries of the protection zones are defined with the act of a physical parameter, called the equivalent continuous sound level. Attention is given to a forecast of foreseeable traffic the determination of the equivalent continuous sound level, the noise protection area for Dusseldorf Airport, and additional measures required to solve aircraft noise problems.

Muller, EA Matschat, K Leinemann, H Koppe, E *Airport Forum* Vol. 5 No. 6, Dec. 1975, pp 47-54, 5 Fig., 1 Phot.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

05 155770

**FAA'S FIVE-YEAR ENVIRONMENTAL PLAN, 1976-1980-NOISE**

The FAA noise reduction plan is considered with attention given to system analysis to develop future civil aviation noise certification goals, noise reduction at the source (the vehicle), noise reduction through aircraft and ATC operational procedures, noise reduction through airport operational procedures and noise reduction through airport-environment use and construction measures. A land-use compatibility program is described.

Meistes, FA (Federal Aviation Administration) *Noise Control Engineering* Vol. 6 No. 3, May 1976, pp 92-100, 8 Fig., 1 Tab.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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05 155791

**THE ROLE OF EPA IN REGULATING AIRCRAFT/AIRPORT NOISE**

The paper gives a brief overview of past and present activities of the EPA in its continuing effort to provide public health and welfare guidelines and specific proposals for abating aircraft noise. Particular attention is given to the legislative history and current status for a long-range program of noise control and abatement. While implementation of aircraft operational and source noise regulations will bring considerable relief to a large sector of noise-impacted population, they alone are incapable of eliminating the problem. Promulgation, they alone are incapable of eliminating the problem. Promulgation of an airport regulation in conjunction with more responsible land use planning around airports is expected to prevent aggravation of the problem. Future regulatory actions are identified.

Proceedings of the International Conference on Noise Control Engineering, Inter-Noise 75.

Nozick, JS Schettino, JC (Environmental Protection Agency)  
Tohoku University Proceeding 1975, pp 155-158

ACKNOWLEDGMENT: International Aerospace Abstracts

ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-44582

05 155821

**EXTENSION OF THE AIRPORT DEVELOPMENT AID PROGRAM**

A bill which provides for (1) the expansion and improvement of the airport and airway system, (2) the delegation of certain airport development functions to states and airport sponsors, and (3) permits financing of airway facilities maintenance from the Airport and Airway Trust Fund is discussed. Emphasis is placed on increasing state and local involvement in Airport management and decreasing federal control.

Prepared for US Senate Committee on Commerce, Subcommittee on Aviation.

Government Printing Office Sept. 1975, 382 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: GPO

05 155832

**AIRPORT AND AIRWAY DEVELOPMENT ACT AMENDMENTS OF 1976**

No Abstract.

Prepared for U.S. Senate Committee on Commerce.

Government Printing Office 1976, 70 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
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05 155844

**AIRCRAFT RECOVERY--THERE IS A SOLUTION**

New equipment and procedures used to recover damaged or disabled aircraft from operational areas of airports are described. Progress in aircraft recovery has been achieved mainly through the recent availability of equipment specially designed to lift and remove particular aircraft. Attention is given to the use and design of air-bag lifting systems, recovery jacks, and general costly equipment maintained by the airports rather than airlines.

Buschky, W (Lufthansa) *Airport Forum* Vol. 3 No. 4, Dec. 1973, p 73, 1 Fig., 8 Phot.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

05 155849

**SINGAPORE AIRPORT--GATEWAY TO THE ORIENT**

General relations regarding the growth of an airport are examined. In the case of Singapore, the unusual situation arises that the airport of an island with a total population of about 2.2 million, which had almost 3.3 million international passengers in 1973, had in one year an increase of 29.8% in the number of passengers. The island's strategic geographic location places it at the aerial crossroads between Southeast Asia and Australia on one hand, and Southeast Asia, the Middle East and Europe on the other. Attention is given to aspects of airport expansion, the terminal building, the runway and apron system, and cargo services.

Mama, HP *Airport Forum* Vol. 5 No. 1, Feb. 1975

ACKNOWLEDGMENT: Massachusetts Institute of Technology

05 155862

**PROMETHEUS UNBOUND-A STUDY OF THE DALLAS/FORTH WORTH REGIONAL AIRPORT--SOCIO-ECONOMIC CONSIDERATIONS. FINAL REPORT**

The history of the controversies in the development of the Dallas/Forth Worth Regional Airport is detailed. Present technological and organizational management problems are outlined. Maps and illustrations are included.

Starling, JD Brown, J Deminus, MI  
Southern Methodist University NASA-CR-142110, Feb. 1975, 90 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
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05 155872

**AIRPORTS--SYSTEMS PLANNING AND OPERATIONS MANAGEMENT**

Airports have a great deal to do with the economic development of the region they serve, consequently, adequate systems planning is necessary to



develop the most economical and functional plan. In addition to a well-designed airport, it is necessary to plan the operational aspects so that the airport is efficiently run. In order to achieve these aims, it is necessary to properly organize the available manpower, taking into account existing and trainable skills. Important throughout the planning is that the resulting airport and its operation must take into account all safety considerations.

Presented at the International Conference on Systems, Man and Cybernetics, Dallas, Texas, October 2-4, 1974.

Arata, WH. Jr (Northrop Corporation)  
Institute of Electrical and Electronics Engineers Proceeding 1974, 5 pp

ACKNOWLEDGMENT: International Aerospace Abstracts

05 155904

## MAPLIN MANAGEMENT ASPECTS--AUTOMATION AND PASSENGER SERVICE

Managing in the 80's a new airport like Maplin will present a different challenge from that which faced the first managers of existing airports. Both the size and the technological content will be different. Objectives and management styles must be carefully chosen and defined, and the airport manager must ensure that the whole airport system gives a high level of passenger service. To do this he must know what the passenger really wants, not what he thinks the passenger wants. It will be difficult to permit large numbers of individual, autonomous organizations to operate in parallel without adversely affecting the level of passenger service. A large degree of automation throughout the whole airport system will be necessary if the maximum planned capacity, approximately 125 million passengers per annum, is to be achieved.

From airports for the 80's Proceedings of the 4th World Airports Conference, London, England 3-5 April, 1973.

Whitford, P (British Airports Authority, London)  
Institution of Civil Engineers Proceeding 1973, pp 125-129

ACKNOWLEDGMENT: International Aerospace Abstracts

05 159714

## SCHEDULING ANALYSIS MODEL OF RURAL COMMUTER AIR SERVICE

The analysis and evaluation of a regional air transport system for urban areas of 10 000 to 50 000 people and for large metropolitan areas have quantitative and qualitative differences. Airport facilities within an intrastate air system often serve as catalysts of community development. The analysis of alternatives, therefore, is different from conventional major air system evaluation. The objective of this paper is the formation of a scheduling analysis model for air commuter systems in rural regions. The optimal transportation alternative will be selected in light of costs, subsidies, and travel demand. The format of this scheduling analysis model incorporates a Markovian decision theory approach. This analysis technique employs the formulation of the system state space, state transition probabilities, and state reward matrices. The alternatives studied reflect differences in service

patterns and scheduling frequency. A test case example involving the Idaho interstate air transportation system was used. /Author/

This article appeared in TRB Record 588, Airport and Air Transport Planning.

Haefner, LE Hutchins, JL Jr (Washington University) *Transportation Research Record* No. 588, 1976, pp 38-43, 5 Fig., 10 Tab., 13 Ref.

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05 163530

## SYSTEMS DESIGN FOR AIRPORT HEALTH MANAGEMENT

Health care at many major airports can best be described as a nonsystem which is skimpy, absent, or chaotic. A cybernetic matrix is created to interrelate the emerging concept of airport health with functional needs and organizations. All resources are integrated into a managerial design to form a feedback-oriented structure to solve airport health problems. Comprehensive health planning would be generated through a constituent-based airport health authority board (AHAB). Traditional airport industrial and private medical practice would function separately and participate intensively as members of the AHAB in joint planning responsiveness. This management design assures provision of comprehensive health services where jurisdiction and responsibility have not been clear in the past.

Kurt, TL (Harvard University) *Aerospace Medicine* Vol. 45 No. 9, Sept. 1974, pp 1067-70, 4 Fig., 28 Ref.

ACKNOWLEDGMENT: International Aerospace Abstracts

05 163532

## THE AIRPORT AND ITS NEIGHBORS--THE REPORT OF THE PRESIDENT'S AIRPORT COMMISSION

No Abstract.

President's Airport Commission No Date

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
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05 200576

## NATIONAL TRANSPORTATION PLANNING MANUAL (1970-1990). MANUAL D: AIRPORTS AND OTHER INTERCITY TERMINALS

the manual is the fourth in a series prepared by the U.S. Department of Transportation for conducting the 1972 national transportation needs study. Three general types of information are concerned: A transportation needs summary, capital improvement program summaries, and individual airport information. /ntis/

Department of Transportation Apr. 1971, 118 pp

ACKNOWLEDGMENT: NTIS  
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PB-207529

## Chapter 6

# AIRPORT PLANNING AND DESIGN

06 080796

### HUMAN DIMENSION IN AIRPORT DESIGN

Design criteria for airports are discussed in the context of the human response to airports. The real and complex logistic problems of moving planes, people, baggage and cars must be translated into spaces that are an uplifting human environment. Organization of spaces must be achieved to counterbalance the inevitable confusion and anxiety of the situation. Departure rooms should be designed to give special consideration to the seating arrangement, so that there is a maximum of diversity. This article is included in *Building Types Study 468*, which also describes airports in Cincinnati, Newark, and Toronto.

Mills, MH *Architectural Record* Vol. 156 No. 7, Nov. 1974, pp 147-148

ORDER FROM: ESL

06 080981

### NEW CONSTRUCTION EQUIPMENT AND TECHNIQUES FOR AIRPORTS

This paper discusses some of the new techniques and equipment used to construct the mammoth Dallas/Fort Worth Airport. As a background to this discussion, the author gives some of the advantages and disadvantages in using new equipment. To give an indication of the magnitude of the Dallas/Fort Worth Airport project, the author relates some of the quantities of materials used on the project. He goes on to mention some of the problems in meeting the contract specifications and tells how they were resolved.

Presented at the 6th Summer Meeting of the Transportation Research Board in cooperation with the Washington Department of Highways, August 6-8, 1973, Olympia, Washington.

Cloud, BB (Zachry (HB) Company) *Transportation Research Board Special Reports* No. 148, 1974, pp 65-68

ORDER FROM: TRB Publications Off

06 129627

### PLANNING AND DESIGN OF AIRPORTS

This text, prepared for students and those engaged in airport development, contains historical information on airport planning and design as well as data on current practices and policies. There are 13 chapters which cover the following topics: the nature of civil aviation; airport financing; aircraft characteristics related to airport design; air traffic control; capacity and delay; airport planning; airport configuration; geometric design of the landing area; planning and design of the terminal area; lighting, marking and signing; heliport and STOLport design; structural design of airport pavements; and airport drainage. A complete bibliography of the basic and frequently revised publications governing these various aspects of airport development is included at the end of each chapter.

Horonjeff, R (California University, Berkeley)  
McGraw-Hill Book Company No Date, 460 pp, Figs., Tabs., 2 App.

ORDER FROM: McGraw-Hill Book Company, 1221 Avenue of the Americas, New York, New York, 10020

06 130428

### MIRABEL

This publication is comprised of a number of papers dealing with Mirabel Airport, problems, impact and future. Each paper has been written by a separate specialist in the field. The topics covered include: Mirabel as the nerve centre of international air transport in Canada, the long walks to the planes, buses in use now but a rapid transit system is coming, the land, the impact, cargo handling, the airport's perimeter as the Industrial Park and the future of Mirabel. Pictures, maps, charts and diagrams are included. /RTAC/

Masse, D Patterson, M (Presse, Montreal) Gray, AD (Gazette Montreal) Fraser, J (Devoir a Montreal)  
Southam Press Limited Sept. 1975, 72 pp, Figs., Photos.

ACKNOWLEDGMENT Roads and Transportation Association of Canada  
ORDER FROM Roads and Transportation Association of Canada, 1765 St Laurent Boulevard, Ottawa, Ontario K1G 3V4, Canada

68

06 131161

### PLANNING DESIGNING AND CONSTRUCTING AIRPORTS IN MEXICO

In the design and planning of airports, Mexico gives primary consideration to the maintenance and operating costs of the proposed facility. The airport is considered an assembly of systems, with the total capacity being not the sum of the individual capacities, but the capacity of that system that has the least capacity. The five systems of the airport, each of which affects capacity, are the air space, the taxiways and aeronautical portion of the apron, the terminal complex formed by the airside and landside of the apron, the access road, and the installation (facilities, mechanical installation, baggage delivery belts). It has been the goal in Mexico to coordinate these systems in such a manner that they can grow separately, depending on demand. So far this appears to be accomplishing Mexico's objectives in regard to meeting airside and landside capacity.

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

Dovali, F (Ministry of Public Works, Mexico) *Transportation Research Board Special Reports* No. 159, 1975, pp 68-71

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06 143009

### SELECTED DOCUMENTS FOR AVIATION PLANNING IN THE TERMINAL AREA

The purpose of the publication is to provide a listing of documents likely to be useful to persons engaged in aviation planning or decision making, particularly for planning on and around airports. Documents are listed in seven categories: (1) Terminal Area Statistics; (2) Standards and Criteria; (3) Terminal Area Planning; (4) Forecasts; (5) Environmental Considerations; (6) Costs/Revenue; and (7) General. Within each category, documents are listed alphabetically and each contains a brief synopsis.

Federal Aviation Administration FAA-ASP-76-3, 1976, 64 pp

ACKNOWLEDGMENT: NTIS

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AD-A028309/3ST

06 143761

### COMPREHENSIVE REPORT. WALNUT RIDGE AIRPORT INDUSTRIAL PARK FEASIBILITY STUDY

This report is based on findings that the city of Walnut Ridge would like to attract more industry. In order to decrease the high rate of unemployment and increase job opportunities, an inventory of the social, economic, and physical resources of the area was undertaken. Objectives for expanding industrial development are to be established.

Flory, RC  
Booker (RW) and Associates Incorporated, Economic Development Administration Final Rpt. EDA-76-109, Apr. 1974, 75 pp

Contract C-3-36766

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

PB-255874/OST

06 144324

### AIRPORTS

The report which notes that there will be a vast amount of airport construction of varying size and scope, describes successful domestic projects that will become prototypical. Recent projects at Miami International Airport utilize the spectrum of techniques available to the process of reviewing an older facility. These techniques include the reorganization of graphics, signage and interior design, and terminal building design to eliminate congestion for international flights. The addition of 750,000 square feet of new terminal space to the 100,000 square foot original terminal at Kennedy Airport, and the expansion and total renovation at the Baltimore-Washington International Airport are outlined. Other projects discussed here include a new arrivals facility at J.F. Kennedy International Airport, recent construction at Toledo Airport, the new Lubbock Regional Airport, and the new airport in Lincoln, Nebraska.

*Architectural Record* Vol. 160 No. 5, Oct. 1976, pp 125-140, Figs.

ORDER FROM: McGraw-Hill, Incorporated, 1221 Avenue of the Americas, New York, New York, 10020

**06 144325  
NEW TERMINAL GOES UP AROUND OLD ONE AT  
CLEVELAND AIRPORT**

The Cleveland Hopkins Airport has become overcrowded with vehicular and pedestrian traffic that warrants a new design to update its facilities. The project, which will cost \$44 million, will double the size of the airport. One of the problems associated with the facelifting plan will be working around people in order to avoid shutting down the airport during the construction period. Some of the design features include the separation of pedestrian and vehicular traffic, two levels of traffic involving a collector/connector system, new parking lots, and facilities for handicapped persons. The project is in the contract bidding state at the present, and is moving along ahead of schedule.

*Construction Digest* Vol. 49 No. 16, Sept. 1976, p 64

ORDER FROM: Construction Digest, Incorporated, Box 603, 101 East 14th Street, Indianapolis, Indiana, 46206

**06 145845  
WESTOVER INDUSTRIAL AIRPARK, CHICOPEE,  
MASSACHUSETTS, (MASTER PLAN 1-4). EXISTING  
RESOURCES**

The master plan for Westover Industrial Airpark is the first step in an effort to create a major new business setting in western Massachusetts. Existing resources, opportunities and constraints must be coordinated with region-wide growth potentials to achieve the orderly conversion of over 1300 acres of surplus Federal land to productive civilian uses. A concise overview of the Master Plan is presented to provide direction for all development decisions affecting the surplus base property. It reflects significant and continuous participation on the part of the Westover Metropolitan Development Corporation, the city of Chicopee and the town of Ludlow.

Prepared in cooperation with CE Maguire, Inc., New Britain, Conn.

Westover Metropolitan Development Corporation, Maguire (CE), Incorporated, Economic Development Administration Final Rpt. EDA-76-046, Apr. 1976, 178 pp

ACKNOWLEDGMENT: NTIS  
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PB-258141/1ST

**06 146652  
AIRPORT AND AIR TRANSPORT PLANNING**

The 7 papers in this Record deal with forecasting air passengers in a multi-airport region, interactive computing techniques in airport master planning, staging runway expansion by dynamic programming for Washington National and Dulles International airports, passenger behavior and design of airport terminals, a new way to survey pedestrian traffic in airport terminals by use of time-stamping cards, analysis of economic impact associated with development of an airport-industrial complex, and scheduling analysis model of rural commuter air service.

Rubin, D *Transportation Research Record* No. 588, 1976, 49 pp

ACKNOWLEDGMENT: NTIS  
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PB-259413/3ST

**06 147285  
IMPROVEMENTS TO AIRPORT DRAINAGE CRITERIA, PHASE  
I**

Most airport pavement damage is caused by free water in the base course and subgrades. Pavement surfaces are difficult to seal and most airports are constructed on base courses and subgrades that have low coefficients of permeability and are not capable of removing much water. The best method of controlling and reducing free water in the pavement structural sections and preventing consequent pavement damage is to provide coarse open-graded macadam base course drainage layers with collector and outlet pipes. When excess water is not allowed to drain from the structural sections, aircraft traffic can cause pumping, faulting, and other problems that are many times greater than those occurring when there is no free water present. Studies have indicated that 80 to 90 percent of all severe damage is caused by excess water in the pavement structural sections.

Fowler, J  
Waterways Experiment Station Final Rpt. FAA-RD-76-59, Oct. 1976, 39 pp

Contract DOT-FA75WAI-536

ACKNOWLEDGMENT: NTIS  
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AD-A033644/6ST

**06 151572  
LH2 AIRPORT REQUIREMENTS STUDY**

A preliminary assessment of the facilities and equipment which will be required at a representative airport is provided so liquid hydrogen LH2 can be used as fuel in long range transport aircraft in 1995-2000. A complete facility was conceptually designed, sized to meet the projected air traffic requirement. The facility includes the liquefaction plant, LH2, storage capability, and LH2 fuel handling system. The requirements for ground support and maintenance for the LH2 fueled aircraft were analyzed. An estimate was made of capital and operating costs which might be expected for the facility. Recommendations were made for design modifications to the reference aircraft, reflecting results of the analysis of airport fuel handling requirements, and for a program of additional technology development for air terminal related items. (Author)

Brewer, GD  
Lockheed Aircraft Corporation Final Rpt. NASA-CR-2700, LR-27581, Oct. 1976, 202 pp

Contract NAS1-14137

ACKNOWLEDGMENT: NTIS  
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N77-10032/9ST

**06 155455  
AIR TRANSPORT AND METROPOLITAN AIRPORTS**

This study which focuses on Sydney identifies the airport architectural-planning needs in qualitative terms of people, both passengers and those who live near airports. First the development of the aircraft is outlined. This is followed by an historical review of the development of Australian Airlines, an investigation of various forms of aircraft and related transport and this application to this continent; a study of the relationship of the airport to the city; and the correlation between income, status and the use of air travel. Major airport design criteria are discussed under the headings of supply and demand factors, and detailed facility requirements. Two major existing Australian airports, Sydney (Kingsford Smith) and Melbourne (Tullamarine) are examined in relation to facility requirements previously established. Much of the information obtained from earlier chapters is then utilized in a study of the airport problems of the Sydney region. Possible solutions are discussed including off-shore airports and city-centre vertical and short take-off and landing airports.

Oppenheim, PT  
New South Wales University, Australia PhD Thesis 1972, 373 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

**06 155491  
A REVIEW OF PHYSICAL AND CONSTRUCTIONAL FACTORS  
AFFECTING THE CAPACITY OF AIRPORTS**

The physical and constructional considerations which to a lesser or greater extent will govern or have an effect on the ability of an airport to meet demand include: (a) site characteristics; (b) runway and strip dimensions, runway strength and surfaces; (c) development works including strengthening, repairs and extensions; (d) rehabilitation and maintenance activities; and (e) overall planning.

Spencer, FW (Scott, Wilson, Kirkpatrick, & Partners) *Institution of Civil Engineers, Proceedings* Vol. 50 Dec. 1971, pp 457-466

ACKNOWLEDGMENT: Massachusetts Institute of Technology

**06 155515  
AIRPORT ANALYSIS: ZURICH-KLOTEN**

This article discusses various aspects of Zurich's Kloten Airport--size, passenger and cargo handling, maintenance and other facilities, and future developments.



*Airports International* No. 29, Aug. 1973, pp 16-17  
 ACKNOWLEDGMENT: Massachusetts Institute of Technology

06 155546

**STANDARD HANDBOOK FOR CIVIL ENGINEERS**

This handbook which is comprehensive but treats each topic as briefly as clarity permits, is written for the nonspecialist in the field. Emphasis is placed on fundamentals rather than on tables of design data. The handbook is composed essentially of 2 parts: Specialty fields and engineering common to those fields. The last includes sections on use of electronic computers, design and construction management, specifications, structural theory, and steel, concrete, wood and other materials.

Merritt, FS  
 McGraw-Hill Book Company 1976, 1150 pp

ACKNOWLEDGMENT: Port Authority of New York and New Jersey

06 155560

**THE DESIGN ASPECTS OF HELIPORTS**

This paper is intended to show what would be necessary for a heliport suitable for scheduled helicopter services should a vehicle become available which proves economically viable for inter-city services. BEA is considering the possibility of scheduled services from Central London to near-European capitals and in this respect, some preliminary investigation of sites has been carried out. This paper is concerned with a heliport which will meet the required standards of safety and regularity, and will provide passenger handling facilities, car parking and support services at least comparable with equivalent fixed wing operations. Other types of landing place for helicopters, such as helipads, helistops, and conventional airports are outside the scope of the paper although similar design criteria may apply to these facilities. The attractiveness of the helicopter is derived from its ability to reach areas otherwise inaccessible to air transport, thus providing rapid direct access to city centres and without the large and expensive airfields required for fixed wing operations. In order to make maximum use of this advantage and ensure a continuing role for the helicopter as a means of transport, it is important that adequate provision is made well in advance, particularly in city centres where the demand for heliport facilities is greatest; suitable sites are few and costs are high.

Slocombe, AE *Aeronautical Journal* May 1973, pp 230-233

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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06 155569

**ASSM-A NEW AIRSPACE/AIRPORT SIMULATION PROGRAM**

This article describes a comprehensive operational tool with which both short-term and long-term system capacity improvements can be identified and quantified, with reference to both the air and ground elements. In addition to measuring both hardware and airport design characteristics, the tool includes operating procedures as an integral part of the program permitting various tradeoff studies involving procedures in relation to other system elements. The Aviation System Simulation Model (ASSM) is a time- and event-based simulation capability fully reflecting real-world operating conditions and is capable of performing a variety of complicated studies of airspace and airport conditions in a matter of a few minutes.

Bales, GA (Aero Analysis, New York) *Journal of Air Traffic Control* Vol. 16 No. 3, May 1974, pp 13-15

ACKNOWLEDGMENT: Federal Aviation Administration Library

06 155695

**SOCIOECONOMIC IMPLICATIONS OF AIRPORT PLANNING**

The ability to meet the growing demand for air transportation facilities will depend on complex, often lengthy planning processes. These planning efforts will require sensitive responses to a number of significant public issues. This article summarizes these issues and indicates that aviation development will involve problems as well as opportunities for the community at large. Suggestions are also made as to the nature of those planning responses necessary to insure the appropriate and timely development of air transportation facilities. For the successful planning of airports, land use and transportation planning must be integrated into a single process. The interrelated issues should be studied concurrently within a common organizational framework. Both new commercial jetports and smaller general

aviation airports can be planned in the context of broader planning objectives. The possibilities are mentioned of multiple-use planning as a form of compensatory action, in which negative impacts on given groups are balanced by other advantages. The need is also indicated for keeping the public fully informed about plans and programs from initial location selection to final engineering design.

Jerome, A Nathanson, J (Howard, Needles, Tammen and Bergendoff)  
*Traffic Quarterly* Vol. 25 No. 2, Apr. 1971, pp 267-286, 2 Fig.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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06 155707

**PIPE-A NEW AIRPORT CONCEPT**

At the heart of the new concept pipe is a simple, closed viaduct, a kind of traffic ring, round which all the important airport functions are grouped. The key word PIPE is intended to indicate that everything-passengers, aircraft crews, personnel, baggage, freight, supplies, waste etc.-converges on or diverges from this ring on several levels, by either conventional or automated transport systems. It is stressed that the system could be applied both the new airports and to airports that are being remodelled. All activities could be planned step by step. In the final account a reduction of at least 20 per cent could be expected in operating costs and capital expenditure. The concept involves better technical cooperation between the airlines, with the object of maintaining special services on a joint basis and thus saving personnel, time and money. All the basic elements would be treated in the same way, the various aircraft types, runways and taxiways, aprons and aircraft parking areas, passenger and freight terminal, control tower, air crew building, maintenance and personnel facilities, workshops, security and emergency systems, access roads and car parks. The apron is rectangular in shape and contains no areas that are difficult to use. Its size depends on aircraft movements on the ground, not on peculiar terminal shapes. Aircraft, grouped by categories, are all parked noise-in along the PIPE, with bridge connections. All separate aprons, taxiways or duplicate handling equipment. When the airport has a parallel runway system, the PIPE ring encloses all the elements. With other runway configurations the passenger terminal and car park lie outside the ring. Since there is today no justification for locating the freight terminal away from the passenger terminal, this building is situated within the operations area, at the point where wide-body aircraft dock. An internal transit system links all points of the operations area with one another. On the airside, taxiways laid out in a double ring, with one-way traffic, make for simple, safe aircraft movements. The grouping of aircraft into size categories reduces the amount of specialized ground operations personnel and the technical services required. And because all equipment is also centralized by sector, aircraft turn-around times should be shorter. A reduction in capital expenditure is obtained primarily by providing a single-level terminal building which can be extended step by step in the form of small modules. Costly baggage conveyor systems would be unnecessary. The apron could manage with a minimum of concrete area. Since the airbridges are used only for specific aircraft types, considerable savings could also be made in this area. Another advantage of the linear aircraft positioning is to be found in the simpler fuelling and airfield lighting installations.

*Airport Forum* Vol. 6 No. 2, Apr. 1976, pp 26-28, 6 Fig.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

06 155712

**TEHRAN INTERNATIONAL AIRPORT**

The Tehran International Airport is designed to cope with the following factors: ability to handle a large volume of traffic at its inception in the early 1980's and increasing steadily throughout the years; a site located 31 miles (50 km) from downtown Tehran; an arid desert-like climate. The airfield consists of dual-parallel runways with one pair built initially on either side of the terminal area. This area is traversed by a "spine" roadway system which forms the passenger terminal with all support facilities. The airport is designed to be linked to Tehran with a high-speed train. This train will be able to travel at a top speed of 80 mph (129 Kmlhr) in open stretches, and, as well, make stops at each of the "terminal modules" spaced some 1,500 ft (457.5m) apart. The terminal itself will be doubled-loaded with train tracks and roadways in the middle. Aircraft gate positions will be arranged in clusters or groups of seven international or eight domestic gates per module-again with pairs of modules on either side of the rail and roadway access.

Prokosch, W (Tippetts-Abbett-McCurthy) *ASCE Journal of Transportation Engineering* Vol. 103 No. TE2, Mar. 1977, pp 223-241, 16 Fig.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

06 155719

## A FRAMEWORK FOR THE EFFICIENT PRODUCTION OF AIRPORT SERVICES

The events that led to the decision on the Third London airport indicated that more efficient airport planning procedures should be adopted in the United Kingdom. This paper discusses some, general principles of the use of resources which could be applied to the planning of new airport investments. Environmental amenities are seen as resources having a value to members of society and which are often foregone by airport operations. The main improvements to existing airport planning procedures would result from more effective incorporation of potential amenity losses, as well as consumer accessibility and other factors, into project design and evaluation. Two decision-making models are outlined which could lead to such improvements. In the favored model the principal beneficiaries of airport facilities (passengers and other users) must pay for the full opportunity costs, including amenity losses, of the services that they enjoy. Their willingness to do so in different circumstances is used as part of the evidence for the planning of additional investments.

Whitbread, M (University College, London) *Regional Studies* Vol. 5 No. 3, Sept. 1971, pp 121-134, 12 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

06 155720

## THE MONTREAL AIRPORT SITE: THE SPATIAL MULTIPLIER AND OTHER FACTORS AFFECTING ITS SELECTION

This article describes the thought and investigative process pursued by the Task Force in an effort to determine the best airport location. Further, it suggests the intimacy of social, political, ecological, and economic considerations when undertaking an investment project with direct investment costs involving hundreds of millions of dollars and with a secondary economic impact expected to run into the billions. On the basis of technical studies already completed the Task Force was asked to study four technically acceptable sites and to make a recommendation in terms of the differential impact of site location on regional development. The site recommended by the Task Force was approved by the Federal Government & opposed by some members of the Provincial Government who feared a spillover of economic effects into Ontario. The main bone of contention was the spatial multiplier--the effect on pattern of land use, location of new industrial developments, and urban growth as it is affected by the physical location of the airport.

*Growth and Change* Vol. 2 No. 1, Jan. 1971, pp 14-22, 1 Fig.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

06 155794

## AIRPORT PLANNING IN THE UK-PAST, PRESENT AND FUTURE

The development of airport policy is traced from the post war period to the present day. The article discusses environmental needs and the most practical methods of dealing with them in the present situation and in the next two decades.

The Challenging Future, Proceedings of the 5th World Airports Conference, 5-7 May 1976.

Carpenter, B (Civil Aviation Authority, England)  
Institution of Civil Engineers Proceeding 1976, 7 pp

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

06 155801

## GERMANY

Airports in the Federal Republic of Germany are organized as private companies (front stock companies, or companies with limited liability), and there is no overall national airport planning authority. The German Airports Association (ADV) Acts in an advisory capacity. It outlines airport planning

requirements by predicting demand and associated investment over periods of five years for each airport. In the present paper, the development of the complex network is discussed, along with the advance planning necessary to deal with the expected increases in traffic, with emphasis on international traffic.

The Challenging Future, Proceedings of the 5th World Airports Conference, 5-7 May 1976.

Treibel, W Treibel, W Proceeding 1976, 13 pp

ACKNOWLEDGMENT: International Aerospace Abstracts  
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A76-46728

06 155802

## BRITISH CONCEPT

In the proposed integrated approach to airport design and construction for developing countries, emphasis is placed on the need to assess the airport projects on broad economic, political, and strategic criteria with the client's interests as the paramount consideration. Professional, impartial interdisciplinary study should be applied to each situation in order that decisions may be made with a certain amount of knowledge on the most probable consequences of the available options. Savings in cost and construction time of concrete pavings can be achieved by simplification of jointing systems and the omission of reinforcement.

The Challenging Future, Proceedings of the 5th World Airports Conference, 5-7 May 1976.

Sharman, FA (Halcrow (Sir William) and Partners)  
Institution of Civil Engineers Proceeding 1976, 8 pp

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-46537

06 155806

## MANAUS-A NEW AIRPORT IN THE VIRGIN FOREST

A description is given of the construction and facilities of the Manaus International Airport, built on land reclaimed from the virgin tropical forest. Facilities and runway are designed to accommodate further expansion, with projections working two decades ahead. The runway is aligned with the direction of the prevailing wind. The airport is constructed on the side of the city opposite to the current prevailing direction of municipal growth. Construction problems with torrential tropical rains are outlined. Passenger amenities, cargo handling capabilities, and tourism development plans are described.

Maksoud, H (Hidroservice Engeharia de Projetos) *Airport Forum* Vol. 7 No. 1, Feb. 1977, 6 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

06 155815

## THE NATIONAL AVIATION SYSTEM PLAN 1976-1985, APPENDIX 2.

The Plan of 1975 is the sixth annual ten-year plan developed by the Federal Aviation Administration. It presents an integrated plan of action for meeting anticipated needs in the National Aviation System through 1985 and provides a focal point for industry/government cooperation in agency planning. Long range plans are made and policies formulated with respect to, the orderly development and use of the navigable airspace, and the orderly development and location of landing areas, Federal airways, radar installations and all other aids and facilities for air navigation, as will best meet the needs of, and serve the interest of civil aeronautics and national defense, except for those needs of military agencies which are peculiar to air warfare and primarily of military concern. The Plan summarizes system additions, improvements, and changes required to meet realistic needs of aviation for the next decade. It is oriented to serve several different groups including aviation users who pay user charges, airport sponsors who build and maintain airports, aviation manufacturers who are helping to construct the system, and FAA personnel who operate and maintain the system.

Federal Aviation Administration Mar. 1975, 109 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
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AD-A013614

06 155838

**NEW YORK OFFSHORE AIRPORT FEASIBILITY STUDY.  
VOLUME 1. INTRODUCTION, SUMMARY AND  
CONCLUSION--ENVIRONMENT PROTECTION AND  
ECONOMIC ANALYSIS. FINAL REPORT**

The feasibility of an offshore airport for the New York Metropolitan Area was studied by investigating a large number of multidisciplinary technical, economic, environmental, and community factors. A summary of the analyses, findings and conclusions is presented, in which the following topics are discussed: air traffic projections, site selection, air side operations, ground access systems, offshore structural concepts, airport configurations, environmental protection, ancillary functions, financial analysis, and community impact. Results show that an offshore airport is technically, financially, and environmentally feasible.

Saphier Lerner Schindler, Incorporated Dec. 1974, 169 pp

Contract DOT-FA71WA-2626

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
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06 155842

**AN AIRPORT SYSTEM FOR UNITED KINGDOM AIR SERVICES**  
The purposes for which the different categories of airport are required are listed, and the basic characteristics essential for the achievement of these purposes are discussed. A new description of airport categories is presented and the economic requirements of airport operation are discussed. The major requirements of an airport are: the year-round operation of scheduled services; the operation of seasonal charter services; provision for business and personal travel. To achieve this, airports must have a satisfactory location, good surface access, operational suitability to the airlines, and adequate capacity. Seven categories of airports (based on runway characteristics) in the United Kingdom (U.K.) are listed and discussed. The air traffic volumes in 1970 in the U.K. are also discussed.

Masefield, P *Aeronautical Journal* Vol. 76 No. 757, May 1972, pp 275-285, 7 Fig., 5 Tab.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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06 155846

**DYNAMIC MANCHESTER AIR TRANSPORT REGION**

The development of the Manchester International Airport is described in terms of investments in facilities designed to meet the growing air traffic requirements in the North of England. Passenger and cargo handling areas being added to accommodate the new 747-type aircraft are discussed along with runway and taxiway modifications. Financing schemes and political constraints are also considered.

Allen, R *Airport Forum* Vol. 3 No. 4, Dec. 1973, p 5, 3 Fig., 1 Tab., 2 Phot.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

06 155858

**PARAMETRIC STUDY OF A COLUMN SUPPORTED  
FLOATING AIRFIELD --AIRPORT PLANNING FOR  
CONSTRUCTION OF LARGE BASE AT SEA USING STABILIZED  
LEGS**

The report discusses the feasibility of constructing a large base or airfield at sea using stabilized legs. The legs, connecting struts, and other equipment would be transported by barge to the building site. There, the barge and payload would be flipped to the vertical and assembled with the option that the barge might or might not be included as a part of the platform.

Scripps Institution of Oceanography June 1973, 43 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

06 155860

**SAN FRANCISCO FLOATING STOL PORT STUDY**

The operational, economic, environmental, social and engineering feasibility of utilizing deactivated maritime vessels as a waterfront quiet short takeoff and landing facility to be located near the central business district of San Francisco was investigated. Criteria were developed to evaluate each site, and minimum standards were established for each criterion. Predicted conditions at the two sites were compared to the requirements for each of the 11 cities as a means of evaluating site performance. Criteria include land use, community structure, economic impact, access, visual character, noise, air pollution, natural environment, weather, air traffic, and terminal design.

Ames Research Center NASA-TM-X-72432, No Date, 89 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
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06 155865

**THE URBAN STOLPORT--SOMETHING FOR EVERYONE**

The reasons for STOL are first briefly examined. The time saving and convenience for the traveller, the reduction in automobile travel, the low noise and low pollution characteristics of STOL aircraft are mentioned. Making reference to Ekistics, the effects of STOLports on a city's development are considered. The future spread of urbanization and STOL's potential for decentralization are discussed. The problems of STOL system implementation are indicated through a matrix of mode characteristics and parties involved. Toronto Island Airport is taken as a case in point to lead to the conclusion that in a STOLport there is something for everyone.

Dunkin, TG Toplis, AF (DeHavilland Aircraft of Canada, Limited)  
American Institute of Aeronautics and Astronautics AIAA 74-1276, Oct. 1974, 12 pp, 11 Ref.

ACKNOWLEDGMENT: International Aerospace Abstracts

06 155866

**DESIGN AND DEVELOPMENT OF MONTREAL AND OTTAWA  
STOLPORTS**

The Canadian Ministry of Transport embarked on a program to provide a downtown-to-downtown scheduled IRR STOL service between Montreal Quebec, and Ottawa, Ontario. As part of the total systems approach to the development of the service, two STOLports were designed and built. Preliminary standards and criteria were developed to enable the design to be carried out. New electronic approach aids and modified visual aids are incorporated into the system. There STOLports began operations in March, 1974.

Button, DL (Canadian Air Transportation Administration)  
Society of Automotive Engineers SAE 740487, Apr. 1974, 8 pp, 6 Ref.

ACKNOWLEDGMENT: International Aerospace Abstracts

06 155868

**AMPHIBIAN STOL AND ITS FACILITIES**

The short-haul transportation problem, worldwide, is characterized by congestion both on the ground and in the air. Solutions in the form of ground transportation are expensive in terms of land utilization, high development costs, their adverse effect on the environment and ecology, and are 20-30 years in the future. STOL offers a solution, but the high cost of land for downtown STOLports has precluded implementation. The STOL amphibian provides a solution which uses existing waterways situated downtown in every major city. It will relieve ground congestion and alleviate saturated airports. Studies show that such a system meets the ten basic requirements established by the National Environmental Policy Act of 1969 and that it contributes significantly to a reduction in the energy consumed in travel to and from the airports.

Smethers, RG, Jr (Lockheed-Georgia Company)  
Society of Automotive Engineers SAE 740488, 1974, 15 pp, 15 Ref.

ACKNOWLEDGMENT: International Aerospace Abstracts

06 155874

**A NEW METHODOLOGY FOR AIRPORT SYSTEM  
PLANNING--AN OVERVIEW**

The paper presents a general description of a methodology developed for airport planning taking into account both local and global planning



requirements. This approach involves two related formulations. The Single Airport Model (SAM) and the Multiple Airport Hub Model (MAM). The MAM contains the SAM as a subset. The SAM analyzes alternatives, such as terminal and field expansion to increase airport capacity, within the context of one airport in isolation. The model contains six major subsystems: airfield supply, terminal area supply, air carrier operations demand, air passenger demand, general aviation demand, and a control subsystem. The approach used in formulating a planning problem in SAM format is discussed. The supply subsystem, which consists of both airfield and terminal area components, and the demand subsystem, which takes into account the demands for airfield capacity by aircraft and for aircraft by passengers, are described. A representative set of planning policies is discussed.

Presented at a Joint National Meeting (46th), San Juan, PR, October 16-18, 1974.

Smith, DG Maxfield, DP (Department of Transportation) Fromovitz, S (Maryland University, College Park)  
Operations Research Society of America, Institute of Management Sciences  
Proceeding Oct. 1974, 34 pp

ACKNOWLEDGMENT: International Aerospace Abstracts

## 06 155876 TRANSPORTATION CORRIDOR PLANNING FOR ARIZONA REGIONAL AIRPORT

Long-range planning begun in 1960 for an international regional airport in Arizona has progressed to the point where about 80 square miles of land have been designated as the airport site. Part of the ongoing program is planning for a multimodal and high speed transportation corridor serving the airport and linking Phoenix and Tucson. Besides providing for multimodal ground transportation systems, the corridor will also accommodate sewer, gas, and other pipelines as well as power and communication facilities. The concept provides space for an environmental buffer zone. Some considerations for developing a long-range plan for a project of this magnitude are discussed. The importance of region-wide cooperation between agencies involved is emphasized.

Linthicum, WW (International Engineering Company) *ASCE Journal of Transportation Engineering* Vol. 101 No. TE3, Aug. 1975, pp 415-423, 5 Fig., 3 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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## 06 155877 AN INNOVATIVE APPROACH TO AIRPORT PLANNING

The spirit of foresight and cooperation is described that made the realization of the mammoth Dallas-Fort Worth Airport project possible. The airport was officially dedicated in September 1973. The main considerations that went into the planning of this airport and the experiences of the people who worked on this project are reviewed.

Newman, HL (Federal Aviation Administration) *Journal of Air Law and Commerce* Vol. 39 No. 3, June 1973

ACKNOWLEDGMENT: Massachusetts Institute of Technology

## 06 155878 SYSTEMS ANALYSIS IN AIRPORT MASTER PLANNING

Particular attention is given to changes in the airport master planning process. For the most part these changes are related to the new national mood of environmental concern. In connection with two recent legislative acts, airport planners are beginning to rely more on systems analysis techniques. Questions regarding a balanced planning solution are discussed along with the availability of new analytical tools. An aircraft air pollution evaluation model is also presented.

Young, CS (Landrum and Brown, Incorporated) Nemec, J, Jr (Booz-Allen and Hamilton, Incorporated). *ASCE Journal of Transportation Engineering* Vol. 100 No. TE4, Nov. 1974, pp 883-941, 3 Fig., 4 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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## 06 155884 DULLES URBAN CENTER CONCEPTS

The report presents a multidisciplinary study to determine the feasibility of developing a unique urban center to be located in the vicinity of the Dulles International Airport property, utilizing transportation, urbanization and aviation concepts developed in the planning concepts study. The investigation includes alternative programs, locations and land uses, vehicular circulation and parking concepts, pedestrian circulation, economic objectives and analyses, building types, massing, volume, site studies, methods of financing, operation, ownership and the role of government agencies, as well as the private sector.

Allum, RD Billingham GD Dimster, F Grein, C Hurlbut, LJ  
Pereira (William L) Associates DOT-FA72WA-2279, 1973, 132 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

## 06 155894 OFFSHORE AIRPORT SITE PLANNING

The project considered involves an airport constructed on or within an earth or rockfill structure. The structure may be filled completely to an elevation a few feet above maximum water level. Alternatively, it may consist of a dike completely inclosing an area of the sea or lake bottom, from which the water is pumped after completion of the dike. Five of the eight largest cities in the world with adjacent large water bodies have studied possibilities for the development of offshore airports. A description is provided of design and construction methods which may be used to obtain a satisfactory degree of safety for offshore airports, giving attention to landfills and the dike and polder concept. Cost factors for airport sites are discussed along with environmental considerations.

Wheby, FT *ASCE Journal of Transportation Engineering* Vol. 100 No. TE3, Aug. 1974, pp 543-551, 1 Fig., 28 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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## 06 155896 CHARLES DE GAULLE--THIRD PARIS AIRPORT

The search for a new Paris airport began in 1957 when it became apparent that increasing demands for airport facilities could not be satisfied by the enlargement of existing airports. The present site for the new airport in an area about 15 miles northeast of the city was selected in 1959. The actual construction work started at the end of 1966. Plans for the airport design were based on a peak traffic level of about 150 aircraft movements an hour in the final development stage. The runway and taxiway systems of the new airport is discussed along with the airport road system, the terminal complex, the routes for departing and arriving passengers, the automatic transport system, the fog dispersal system, and airport access facilities.

de Balard, J *Airport Forum* Vol. 4 No. 2, June 1974, p 13

ACKNOWLEDGMENT: Massachusetts Institute of Technology

## 06 155910 MAPLIN-PLANNING ASPECTS AND THEIR INFLUENCE ON AIRPORT DESIGN

The paper deals first with the specific problems that are a direct outcome of the site choice, in particular the problems of access to the airport. Land-use planning for the reclaimed site is discussed, including the way in which the airport will develop in stages to its ultimate four runway configuration. The strategic planning of the terminal zone is dealt with in some detail, in particular the influence that rail access will have on the development of passenger facilities and vice versa. Inter-terminal movements and other communication requirements are discussed, showing how an integrated public transport system serving the airport link to principal areas of new urbanization and the seaport create both an opportunity and a challenge for the future.

From Airports for the 80's. Proceedings of the 4th World Airport Conference, London, England 3-5 April 1973.

Walter, KB (British Airports Authority, London)  
Institution of Civil Engineers Proceeding 1973, pp 115-118

ACKNOWLEDGMENT: International Aerospace Abstracts

06 155912

**THE ROLE OF LOCAL PLANNING AUTHORITIES IN RELATION TO THE SITING AND DEVELOPMENT OF AIRPORTS**

Planning considerations are given for the siting of new airports and the development of control of existing airports. It is proposed that the decision making in siting new airports should be made at national and regional levels and that a national policy be adopted in this matter. Noise, urban development and growth, air route patterns, public participation in making local decisions, land safeguarding for future airport growth, and relations of airports and nearby countryside are covered as airport siting factors. The main point of the discussion is the close interrelation between operational concern and environmental response which must be given prime consideration.

From Airports for the 80's. Proceedings of the 4th World Airports Conference, London, England, 3-5 April 1973.

Sibert, EG

Institution of Civil Engineers Proceeding 1973, 5 pp

ACKNOWLEDGMENT: International Aerospace Abstract

06 158215

**TRANSPORTATION SCIENCE, WHAT DOES IT MEAN?**

[Vervoer-en Verkeerskund: Wat is dat]

This article gives a description of a systematic arrangement of concepts such as transport organization and transport systems. Harbours, stations and airports as links between water, road, rail and air transport systems. Relationships between activities such as technology, physical planning, transport management, estimating future transport patterns with planning on one side, and design, construction and traffic control on the other. Diagrammatic presentation of the interactions between these concepts. [Dutch]

Heere, E (Ingenieursbureau Dwars, Heederik en Verhey, Neth) *Verkeerskunde Analytic* Vol. 27 No. 12, Dec. 1976, pp 594-94, 4 Fig., 4 Tab.

ACKNOWLEDGMENT: TRRL (IRRD 248849)

ORDER FROM: Dutch Touring Club ANWB, Wassenaarseweg 220, Box 2200, The Hague, Netherlands, s

06 158217

**PLANNING AND OPERATION OF AIRPORTS [Programmazione e gestione aeroportuale]**

This article analyses the causes of the low growth rate of air traffic in Italy in recent years. Airport siting in relation to urban areas, noise control problems, space requirements and land use, and rapid access, are discussed. Operating conditions and tariffs at Rome and Milan airports are discussed in relation to public and private interests, and operational productivity. [Italian]

Fassina, G *Strade Analytic* No. 5, Sept. 1976, pp 353-63, 8 Phot.

ACKNOWLEDGMENT: TRRL (IRRD 225329)

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06 158236

**BASIC CONSIDERATIONS FOR OFFSHORE AIRPORT CONSTRUCTION**

The basic considerations suggested for the construction of an offshore airport are: (1) Safe construction; (2) functional requirements; (3) operational efficiency; (4) convenience; (5) costs; (6) regional goals; (7) provisions for future; (8) state-of-the-art; and (9) acceptability. The construction plan which emerges as a result of the preceding basic considerations must include all those details that are required to produce a balanced, integrated, flexible, and economical offshore airport, in harmony with the environment. The marine platform and the access routes will require special considerations in the construction of an offshore airport. The major problems will be on account of the large-scale difficult and unprecedented construction over water, the logistics, and the pollution of the marine environment.

Hussain, A (Ministry of Defense and Aviation, Saudi Arabia) *ASCE Journal of the Construction Division* Vol. 103 No. 1, Mar. 1977, pp 7-21, 10 Ref.

ACKNOWLEDGMENT: EI

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06 163497

**BARE BASE ELECTRICAL SYSTEM**

Design data are given for an instant, do-it-yourself electric power system for temporary airports which may be transported by planes anywhere in the world, and set up for operation within 72 hours. The Bare Base electrical system is the first known air mobile system having high voltage generation and transmission (primary) and a transformed low voltage (secondary) distribution at the using points. It features a hard wire equipment safety grounding conductor from the generator to the very last piece of equipment. The primary or high voltage portion is 4160V, three phase-three wire-grounding 60 Hz and the secondary are low voltage portion is 120/208V three phase-four wire-grounding-60 Hz.

Proceedings of the 24th Intl Wire and Cable Symposium, Cherry Hill, New Jersey, May 18-20, 1975.

Wimsey, JE (Department of the Air Force)

Army Electronics Command Proceeding 1975, pp 237-254, 1 Ref.

ACKNOWLEDGMENT: EI

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06 163536

**TWA HANGARS OF THIN SHELL DESIGN**

TWA hangars at the Kansas City International Airport match the shape of the giant jets. The design molds hyperbolic paraboloid concrete shells into an efficient shop area. Since the design is rather unconventional and utilizes ultimate strength designs, a sophisticated series of tests were conducted on scale models of the hangars.

Heinz, RA *ASCE Civil Engineering* Vol. 45 No. 1, Jan. 1975, pp 55-59

ACKNOWLEDGMENT: EI

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06 203778

**DESIGN AIRPORTS FOR A MAXIMUM CAPACITY**

A "spiralport" is proposed to ensure maximum utilization of airport capacities. The spiralport is laid out so that there will be three full time, full use runways for landings, and three for takeoffs. The runways are set to converge in order that the points of intersection of the final approach courses will be more widely spaced. /iaa/

Daly, M *Airport Forum* Dec. 1971, p 7

ACKNOWLEDGMENT: International Aerospace Abstracts

06 227275

**FORCES FOR CHANGE IN AIRPORT PLANNING AND DESIGN**

The climate of architectural practice for airport planning and facilities design is changing in three major ways: the slowing rate of increase in numbers of passengers served at major city airports; the increasing attention of public authorities to the effects of airports themselves upon the ecology of regions in which they are proposed; and the persistent consideration of mass transit linkage to airports. The automobile is now and probably will remain the major ground transport to and from the airport. The relationships of parking capacities to airport design are complicated by the client structure at airports. The goal is to plan and design and build economical and efficient airports, acceptable to surrounding environs, readily accessible and convenient to the traveling public, with inherent flexibility to expand or be reconfigured as newer passenger and cargo services develop. /author/

*Architectural Record* Vol. 148 No. 2, No Date, pp 60-61

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## Chapter 7

# AIRPORT SAFETY AND SECURITY

07 043646

### A MICROWAVE TECHNIQUE FOR DETECTING AND LOCATING CONCEALED WEAPONS

The subject of this report is the evaluation of a microwave technique for detecting and locating weapons concealed under clothing. The principal features of this technique are: persons subjected to search are not exposed to objectional microwave radiation; a simple threshold detector can be used as the decision element obviating complex signal processing; system operation does not require extensive operator training; the resolution of the system (2 inches x 2 inches) permits location of a suspected weapon. This latter feature eliminates the need for a complete search of a passenger. Results of a laboratory measurement program are presented in support of the technique. (Author)

Weigand, RM

Transportation Systems Center Final Rpt DOT-TSC-OST-72-16, Dec. 1971, 51 pp

ACKNOWLEDGMENT: NTIS

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PB-213323

07 094542

### DETERMINING THE POTENTIAL OF RADIOFREQUENCY RESONANCE ABSORPTION DETECTION OF EXPLOSIVES HIDDEN IN AIRLINE BAGGAGE

The potential of the radiofrequency resonance absorption spectroscopy (RRAS) techniques for detecting specified quantities of specific explosives in checked airline luggage was investigated. The RRAS techniques considered in this study included nuclear magnetic resonance (NMR), electron spin resonance (ESR) and nuclear quadrupole resonance (NQR). It was found that all the explosives, except black powder, could be detected by NMR and that the NMR response from explosives could be separated from the response produced by other materials likely to be found in luggage. It was also found that black powder and smokeless powders could be detected by ESR but none of the other explosives produced an ESR response. NQR was found useful only for the detection of the RDX base explosive C-4 but even this material could be more sensitively detected by NMR. The results were sufficient to demonstrate the basic feasibility of using NMR for detection of responses from materials in the large volumes required to inspect checked baggage, but limitations on the available laboratory equipment prevented positive detection of explosives or explosives simulants in this space.

Rollwitz, WL King, JD Shaw, SD

Southwest Research Institute, Federal Aviation Administration Final Rpt. FAA-RD-76-29, SwRI-15-4225-F, Oct. 1975, 103 pp

Contract DOT-FA75-WA-3635

ACKNOWLEDGMENT: NTIS

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AD-A022111/9ST

07 127284

### SECURITY OF AIRPORT PARKING LOTS

The layout of most airport parking lots makes them very vulnerable to crime attempts. The security at these parking lots must be tightened in order to protect the employees and the public from these attempts. This article deals with two types of airport parking lots: public parking lots used by passengers and parking lots used by freight services employees. Security measures that can be taken are described under five main topics: physical security, police support, cooperation of parking lot operator, traveler cooperation, and support from other airport personnel. Physical security includes such considerations as fencing, lighting, signage, and technology. Each type of parking lot is treated separately, the analysis concluding with twenty questions to be considered in providing maximum security for a cargo employee parking lot.

Murphy, HJ (Air Transport Association of America) *Security Management* Vol. 19 No. 2, May 1975, 4 pp, 3 Fig.

07 155489

### WEAPON DETECTION AT AIRPORTS

The author highlights some of the major problems and surveys the kinds of weapon detectors available. In addition, the editors asked all the manufacturers known to them for material on their equipment and, whenever a reply

has been secured, describe these products in brief within the article. The devices reviewed here include: hand-held electronic metal detectors; static electronic metal detectors (gate or arch type); X-ray systems for baggage/cargo; and explosive vapor detectors.

Gill, G (British Airways) *Airport Forum* Vol. 5 No. 4, Sept. 1975, pp 79-82

ACKNOWLEDGMENT: Massachusetts Institute of Technology

07 155554

### THE FEDERAL AIRWAY SYSTEM

This publication provides information on airports, facility ground aids, safety aids, communications, navigation and air traffic control. Descriptions of various weather monitoring as well as ground monitoring and flight inspection systems are also provided. Intermediate airfields, Alaskan airports, FAA airports, municipal county and state airports are reviewed as well as private airports, military airports and heliports. Lighting, marking, wind indicators and guidance signs are briefly described, and descriptions of arresting systems, fire fighting, and crash rescue equipment are provided. Communication aspects related to flight service stations, point to point communication, interphone system, land line teletypewriter services, flight advisory service, and VHF/UHF direction finders, etc. are outlined. The short distance navigation system, the instrument landing system and the long distance system are discussed, and a selected list of source material is provided.

Jackson, WE

Institute of Electrical and Electronics Engineers 1970, 485 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

07 155585

### WORLD'S TIGHTEST AIRPORT SECURITY?

Coordination is identified as the key to the success of the security system at Detroit's Metropolitan airport. The system involved the following procedures: establishing procedures and systems for physical security of the many installations and kinds of property at the airport; measures to prevent loss of air cargo; coordinating the efforts of security personnel; managing the system; and developing policy manuals. Regular coordination meetings are held with well-defined goals. The main features of the overall program include badge and vehicle identification systems for authorized personnel; extensive inspection systems; strategic control points for traffic flow of all kinds; guard systems; and an educational and training program.

*Airport Services Management* Vol. 14 No. 9, Sept. 1973, pp 40-43

ACKNOWLEDGMENT: Federal Aviation Administration Library

07 155591

### AIRPORT, AIRCRAFT AND AIRLINE SECURITY

This authoritative text fills many voids on the subject of air transportation related security. Security problems and solutions in preventing hijacking and in protecting cargo and baggage are covered in detail. Credit card frauds and the security of ticket stock are also discussed. The legal aspects of screening, the predeparture screening procedures, metal detectors and x-ray inspection, weapons, prisoners and restricted articles are considered as well as baggage, cargo and exempt flights, and bomb threats. Specific aspects of airport security considered here include the following: government regulations, perimeter security and lighting, identification for security, terminal and ramp security, law enforcement, communications and contingency planning, and general aviation security. The special aspects of air freight security are detailed.

Moore, KC

Security World Publishing Company, Incorporated 1976

ACKNOWLEDGMENT: Federal Aviation Administration Library

07 155593

### THE SAFE AIRLINE

This book explains airline safety principles. Safety philosophy and law as well as the measurement of air safety are discussed in detail, and the regulatory function of the government is reviewed. Comments are made on the airline, the airliner and the airline pilot. Crimes against aircraft are also discussed. The survivable accident, accident causes, accident investigation and accident liability are considered as well as hazardous cargo, and noise



abatement. General aspects of the airport, maintenance and overhaul power requirements, and economic aspects are also covered.

Ramsden, JM  
MacDonald & Jane's 1976, 231 pp

ACKNOWLEDGMENT: Federal Aviation Administration Library

07 155741

#### A TOTAL SYSTEM FOR AVIATION SECURITY

This article describes the various airport security measures available. The airport operator's responsibility for proper security begins at the property boundary and ends at the threshold of the aircraft. The various methods employed for controlling boundary intrusion includes metal chain link fences, patrols, and sophisticated equipment such as closed-circuit TV, low-light lenses, ground vibration detectors and microwave fences. All vehicle access must be positively identified at the access gate and may be further controlled inside the airport grounds by dividing the airport into security zones—each zone having a corresponding security pass. Staff access can be controlled by requiring ID cards to be displayed in plain view, the use of colors, overlays and zone punching. The need for the security screening of passengers will always remain. Various methods include metal detectors, x-ray scanning, and explosive vapour detectors. The author concludes that it is wise to have an airport surveyed by a professional surveyor who will be able to relate his previous experience to each airport.

Dorey, F *Interavia* Vol. 31 No. 6, June 1976, pp 543-544, 1, Phot.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

07 155755

#### SECURITY PROBLEMS AT AIRPORTS

The paper considers the effects and needs of security to combat aviation terrorism. The nature of the threat either of sabotage or hijacking is analyzed and a brief history of moves to define and combat such threats is given. The U.K. position is set out in detail. The separate roles of airport security staff and police are outlined and practical measures for achieving security are described. The need for future airports to be planned with security in mind from the outset, and the need for security awareness throughout the industry are stressed.

From the Challenging Future. Proceedings of the 5th World Airports Conference, Brighton, England, 5-7 May 1976.

Farmery, R  
Institution of Civil Engineers Proceeding 1976, 7 pp

ACKNOWLEDGMENT: International Aerospace Abstract  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-46542

07 155848

#### FIRE-FIGHTING IN AIRPORT PREMISES

Airport systems and facilities constituting potential for hazards are listed in a table together with the preferential fire-extinguishing methods to be used. A description of extinguishing methods is given, taking into account the extinguishing mechanisms involved, their field of application, their specific advantages, and their drawbacks. Attention is given to the foam extinguishing method, the dry powder extinguishing method, the combined powder/-foam extinguishing method, the high-expansion foam method, the water extinguishing method, the carbon dioxide extinguishing method, and the halocarbon extinguishing method.

Scheichl, L *Airport Forum* Vol. 5 No. 1, Feb. 1975, p 31

ACKNOWLEDGMENT: Massachusetts Institute of Technology

07 155873

#### PLANNING AN AIRPORT DISASTER DRILL

This paper serves as a guide for planning airport disaster drills, particularly at the major air carrier airports. Their recommendations are subject to change according to the needs of the individual airport and the particular circumstances that may be present. Basically, the recommendations are founded on the experience gained by participation in planning and carrying out five separate emergency on disaster drills (Oakland International Airport-1, San Francisco International Airport-2, Los Angeles International

Airport-2). The authors also have been involved in a total of three additional disaster drills in California and have been involved in one way or another in an additional 19 airport disaster drills throughout the United States. The presentation is divided into segments according to activity. However, it should be noted that there is a cohesiveness necessary for disaster planning if the drill is to be successful.

Hays, MB Stepanki, JX Cheu, DH (California Aviation Safety Council)  
*Aviation, Space and Environmental Medicine* Vol. 47 No. 5, May 1976, pp 556-560

ACKNOWLEDGMENT: Massachusetts Institute of Technology

07 163477

#### INTERNATIONAL SEMINAR ON AIRCRAFT RESCUE AND FIRE FIGHTING, 1976

The volume contains 34 papers covering the current methods and equipment used at airports to improve survivability from fire after aircraft accidents. Papers also cover specific aircraft design features for evacuation or rescue, as well as airport fire fighting facilities. Analyses are made on extinguishing media efficiency. The majority of papers is in English, with a few in French and German languages.

Intl Seminar on aircraft Rescue & Fire Fighting Geneva, Switz, 13-17 Sept. 1976.

National Fire Protection Association Proceeding 1976

ACKNOWLEDGMENT: EI

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07 163479

#### SOURCES OF LOW-LEVEL WIND SHEAR AROUND AIRPORTS

The intent of this paper is to point out to the aircraft operations, and particularly to the aircraft safety investigation communities, some of the potential sources of low-level wind shear at and around airports. It is evident from the survey that mathematical models of wind shear, particularly over and around buildings, require considerably more development to provide guidance material for the design of airports and aircraft and for establishing requirements, criteria, and procedures for reporting wind shear to pilots.

Fichtl, GH (Marshall Space Flight Center) Camp, DW Frost, W  
*Journal of Aircraft* Vol. 14 No. 1, Jan. 1977, pp 5-14, 63 Ref.

ACKNOWLEDGMENT: EI

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07 163492

#### CONCEPT STUDY: FEASIBILITY OF CHARACTERIZING AIRFIELD. THE HAZARDS OF DEVELOPING ASSIGNMENT CRITERIA FOR FIRE SUPPRESSION RESOURCES

This report presents the results of a project that was undertaken to correlate aircraft fire hazards a ground with some quantified airfield parameters involving aircraft operations. The objectives of this study were to explore the feasibility of: (1) correlating aircraft accident/incident history data with airfield operations data in order to characterize aircraft for hazards which exist in aircraft operations on airfields, and (2) developing the criteria needed to assign crash fire suppression equipment to airfields in a manner that reflects the level of an aircraft fire hazard which exists at a given airfield and by capability of specific equipment to deal with the hazards that actually exist.

Kirby, WE Ruggles, BF  
Aircraft Ground Fire Suppression & Rescue Off, DOD Final Rpt.  
DOD-AGF-76-4, Feb. 1976, 49 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
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AD-A024449

07 163493

#### BIRD CONTROL AT THE AIRPORT

In 1971 Bird-Aircraft collisions damaged or destroyed 383 Air Force Aircraft and inflicted serious injuries on several pilots. More bird-strikes occur during takeoff and landing than any other phase of flight. This fact underscores the need for bird control in the immediate vicinity of the airfield. Birds may be dispersed locally by any of a great number of means designed

to elicit an escape response. Radar detection of birds may enable pilots to evade approaching flocks.

Meyer, GE Boulter, MJ (Air Force Weapons Laboratory) *Astronautics and Aeronautics* Vol. 11 No. 12, Dec. 1973, pp 55-57, 6 Phot.

ACKNOWLEDGMENT: International Aerospace Abstracts  
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07 163498

## EFFECTIVENESS OF FOAM ON EMERGENCY LANDINGS

Various effects of runway foam application, the use of aqueous film-forming foam, and aircraft landings made on foam are discussed with respect to life hazard consideration.

Hedwall, RF (Denver Fire Department) *Fire Engineering* Vol. 28 No. 10, Oct. 1975

ACKNOWLEDGMENT: EI  
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07 163500

## EMERGENCY AND DISASTER PLANS, AND ASSOCIATED PROBLEMS CONCERNING MAJOR AIRCRAFT ACCIDENTS

Potential emergencies resulting from the crash of a wide-bodied jet and disaster plans developed for emergencies of such magnitude are discussed. The basic functions of the National Transportation Safety Board and implementation of a disaster plan (including crowd control, fire and rescue operations, on-scene medical aid and evacuation, and wreckage investigation and handling) are outlined. A review of disaster programs in the Washington, D.C., Metropolitan Area conducted by the Safety Board in described, and two aircraft accidents involving problems of recovery and rescue operations in a remote area and near a metropolitan airport are detailed. The development of airport-based emergency facilities is considered.

SAFE Annual Convention and Trade Exhibit (12th), Las Vegas, September 8-12, 1974.

Childs, JT (National Transportation Safety Board)  
Survival and Flight Equipment Association Proceeding 1975, pp 98-103

ACKNOWLEDGMENT: International Aerospace Abstracts

07 163503

## FEDERAL AVIATION ADMINISTRATION'S AIRPORT CERTIFICATION PROGRAM: HAS IT RESULTED IN SAFE AIRPORTS?

The Federal Aviation Administration's efforts to upgrade the safety of airports used by trading public are discussed. Minimum safety standards for the operation of airports and a certification program were established. Improvements resulting from the airport certification program include upgrading firefighting and rescue equipment, reducing hazards caused by obstructions, and establishing and improving emergency plans.

General Accounting Office Aug. 1975, 35 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

07 163506

## FIRE, POLICE, EMT PLAY PART IN PLAN TO PROTECT BUSY METROPOLITAN AIRPORT

The author outlines an emergency plan of the Rochester-Monroe County, N.Y., Airport, not far from the shore of Lake Ontario, that coordinates the assistance of numerous outside agencies. In addition, the airport has an equipment maintenance program to make certain that the crash crew's apparatus and other equipment is ready to handle any disaster.

Dymont, R *Fire Engineering* Vol. 120 No. 1, Jan. 1977, p 36

ACKNOWLEDGMENT: EI  
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07 163507

## FIRE-FIGHTING AND RESCUE TECHNIQUES AND EQUIPMENT--FOR AIRCRAFT SAFETY

Part I of the paper deals primarily with the development of fire extinguishing materials to deal with the high potential fire risks presented by modern

aircraft. The aim is to achieve major control of the fire within a very short time in order to effect rescue. The advantages and disadvantages of water-based foams, dry powders, inhibiting liquids or gases and water sprays are discussed. In Part II the practical aspects are dealt with, particularly in relation to the recommendations of the International Civil Aviation Organization. Both parts of the paper emphasize that speed and efficient deployment of staff and equipment are essential, and that airports must have emergency plans for instant implementation.

From the Challenging Future, Proceedings of the 5th World Airports Conference, Brighton, England, May 5-7, 1976.

Nash, P Lodge, JE (London Civil Aviation Authority)  
Institution of Civil Engineers Proceeding 1976, 8 pp

ACKNOWLEDGMENT: International Aerospace Abstracts

07 163513

## MATHEMATICAL MODEL FOR ANALYZING THE TRADE-OFFS IN AIRCRAFT HANGAR DELUGE SPRINKLER SYSTEMS DESIGN

The author explores the use of simple mathematical models in optimizing the design of fixed protection systems by testing the cost sensitivity of an aircraft hangar foam-water deluge system to variations in semi-arbitrarily fixed design parameters.

Shpilberg, D (Massachusetts Institute of Technology) *Fire Technology* Vol. 10 No. 4, Nov. 1974, pp 304-314, 7 Ref.

ACKNOWLEDGMENT: EI  
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07 163516

## OCCUPATIONAL HAZARDS AT AIRPORTS

Surveys were conducted at a number of large metropolitan airports with the aim of uncovering the most prevalent dangers faced by ground workers. Responses to a general questionnaire revealed a lack of formal or uniform planning in staffing and response to medical emergencies and/or disasters. Management interviews and facility tours by an industrial hygienist pointed out in detail the most frequently encountered and severe hazards faced by airport support personnel in various types of ground activities. Recommendations based on survey results include drawing up an airport master plan for medical coverage, establishment of uniform occupational safety and health standards for all presently semi-autonomous ground facilities, and permanent hiring of a professional industrial hygienist to supervise all aspects of airport compliance with OSHA standards.

Karol, EM Gage, H (Marsh and McLennan) *Journal of Safety Research* Vol. 7 No. 4, Dec. 1975, pp 147-155, 15 Ref.

ACKNOWLEDGMENT: EI  
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07 163525

## SOME PSYCHOLOGICAL CONTRIBUTIONS TO DEFENSES AGAINST HIJACKERS

This article traces the historical development of aerial hijackings internationally and domestically and psychological contributions toward their control. As the U.S. hijacking problem increased, the FAA gathered an interdisciplinary study team to derive controls. Selective boarding gate screening procedures were created which used a behavioral profile to identify high risk passengers of search. A library was established for accumulating all available information on hijackings. This information is used for: developing new profiles and deriving tactics to teach airline crews for defense against future hijackers. Tactical training programs were developed. Their usefulness was demonstrated operationally, and they have been distributed to all U.S. and many foreign carriers. A research program continues for upgrading defenses.

Proceedings of the Human Factors Society Annual Meeting (18th), Huntsville, Alabama, 15-17 October 1974.

Dailey, JT Pickrel, EW (Federal Aviation Administration)  
Human Factors Society Proceeding 1974, pp 172-175

ACKNOWLEDGMENT: International Aerospace Abstracts

07 163537

**USE OF ROCKETS AGAINST FIRES IN AIRPORT AREAS**

An account is given of a continuing study undertaken for evaluating the feasibility of the concept of using a number of rockets, controlled by a computerized aiming system, for crash fire fighting in airport areas in a very short time. Following a general discussion of some possible vehicle configurations and system operating modes, a specific solution based on small ballistic rockets is considered in particular. Details are given of a simulation study being still in progress, intended for providing the major specifications for the system components performance with respect to efficacy reliability and safety requirements.

Proceedings of AGARD Conference No 166, Rome, Italy, April 1975.

Andrenucci, M Dini, D (Pisa University, Italy)  
Advisory Group for Aeronautical Res & Dev-NATO Conf Paper Paper  
20, 1975, 12 pp, 11 Ref.

ACKNOWLEDGMENT: EI



## Chapter 8

# AIRSIDE DESIGN AND OPERATIONS

08 050141

### REDUCTION OF PARALLEL RUNWAY REQUIREMENTS

The report presents results and recommendations concerning the relaxation of spacing requirements for independent instrument flight rules parallel approaches into closely spaced runways. All results presented in the report are derived by analyzing what system design or performance changes are required (either airborne or ground based) so as to result in safety equal to the current system's, but at closer spacing. A set of system changes and improvements are specified which, based on analysis, will permit closer runway spacing. (Author)

Haines, AL

Mitre Corporation Final Rpt MTR-6282, Jan. 1973, 61 pp

Contract DOT-FA70WA-2448

ACKNOWLEDGMENT: NTIS (AD-764668/0)

ORDER FROM: NTIS

AD-764668/0

08 054427

### AIRPORT SURFACE TRAFFIC CONTROL SYSTEMS DEPLOYMENT ANALYSIS

The report summarizes the findings of an analysis of ASTC (Airport Surface Traffic Control) system requirements and develops estimates of the deployment potential of proposed system alternatives. The tower control problem areas were investigated by a survey of 19 airports including: visual observations, interviews with tower personnel, collection of data of record and an analysis of tower communication tape recordings at selected airports. Data were also collected from regional FAA authorities and airport authorities on facility expansion and improvement plans aimed at meeting the projected air traffic demand. (Modified author abstract)

Baran, G Bales, RA Koetsch, JF

Mitre Corporation Final Rpt Jan. 1974, 142 pp

Contract DOT-TSC-378

ACKNOWLEDGMENT: NTIS (AD-773699/4)

ORDER FROM: NTIS

AD-773699/4

08 057000

### ANALYSIS OF DUAL LANE RUNWAYS

An interservice ad hoc Dual Lane Runway (DLRW) Committee was established in January 1971 to develop, evaluate and demonstrate dual lane runway design criteria, modes of operation and site selection criteria. In support of this effort, data was collected on dual lane runway operations at Cleveland Hopkins, Boston Logan, Los Angeles International, and Atlanta Hartsfield International Airports. The Lincoln Laboratory of MIT was employed to conduct real time (man-in-the-loop) and fast time (canned program) computer simulations of dual lane runway configurations and operation strategies. The bulk of their work dealt with using one runway for arrivals only and one runway for departures only. The dual lane analysis was extended by the Airport Design Branch of the Systems Research and Development Service (SRDS) to include modes of operation where both runways were used for arrivals and one or more runways for departures. A model predicting potential missed approaches was used for this effort. (Modified author abstract)

Ball, CT

Federal Aviation Administration, (FAA-082-421-214) Final Rpt  
FAA-RD-73-97, Mar. 1974, 61 pp

ACKNOWLEDGMENT: NTIS (AD-777914/3)

ORDER FROM: NTIS

AD-777914/3

08 073774

### ANALYSES OF THE CAPACITY OF DULLES INTERNATIONAL AIRPORT, THE BRANDT DRIFT-OFF RUNWAY AND THE MONROE TRIPLE FLOW AIRPORT CONFIGURATION

Analytic models for predicting practical airport capacity have previously been developed and were used to: 1. Determine the practical capacity of Dulles International Airport, 2. Determine the usefulness of the Brandt Drift-Off feature for increasing airport capacity, and 3. Analyze and compare the Monroe Triple Flow configuration with other configurations.

Hooton, EN Stafford, PH Warskow, MA Bonda, WAT  
Airborne Instruments Laboratory No. 7601-2, No Date

ACKNOWLEDGMENT: Flight Transportation Laboratory, MIT (FTL 3-1)  
ORDER FROM: Massachusetts Institute of Technology, Flight Transportation Laboratory, Cambridge, Massachusetts, 02139

08 073974

### AN APPLICATION OF PREDICTOR DISPLAYS TO AIR TRAFFIC CONTROL PROBLEMS

A computer-based predictor display is proposed as an aid for the air traffic controller to use in guiding aircraft to the glidepath. The prediction display significantly improved performance for the easier tasks while it did not significantly improve performance for the more difficult tasks.

Rouse, WB

Massachusetts Institute of Technology DSR 70283-15, Sept. 1970

ACKNOWLEDGMENT: Flight Transportation Laboratory, MIT (FTL 4-0)

08 074073

### AN ANALYTICAL INVESTIGATION OF AIR-TRAFFIC IN THE VICINITY OF TERMINAL AREAS

Several analytical models for air-traffic in the general air terminal area are constructed, with the purpose of exploring some questions about air-traffic congestion. Attention is first focused on a single runway which is used exclusively for landings. A similar analysis is performed for a runway which is used only for take-offs. The results from the basic models are used in order to develop expressions about queueing and delay characteristics associated with various operations. The possibility of inserting departures between successive arrivals, thus increasing airport capacity, is also examined in detail.

Odoni, AR

Massachusetts Institute of Technology Aug. 1969

ACKNOWLEDGMENT: Flight Transportation Laboratory, MIT (FTL 3-2)

08 075265

### AN APPROACH TO SEMI-AUTOMATED OPTIMAL SCHEDULING AND HOLDING STRATEGIES FOR AIR TRAFFIC CONTROL

This paper considers the problem of coordinating the traffic flow and holding patterns of N aircraft which desire to land in a single runway. A distance separation is to be enforced over the outer marker. It is shown that this problem can be attacked as a variation of a linear-quadratic optimal control problem. The solution of this optimization problem can be used to indicate which aircraft can accomplish headway corrections by velocity control, and which require to undergo path stretching or holding maneuvers. The gradual implementation of these strategies in current and evolutionary ATC systems will also be discussed.

Athans, M Porter, LW

Massachusetts Institute of Technology ESL-P-437, Dec. 1970

Grant NASA NGL22009(124)

ACKNOWLEDGMENT: Flight Transportation Laboratory, MIT (FTL 4-1-022)

08 080174

### ANALYSIS OF THE 1972 PERFORMANCE OF THE DYNAMIC PREFERENTIAL RUNWAY SYSTEM AT JOHN F. KENNEDY INTERNATIONAL AIRPORT

For several years Tracor, Inc., the Federal Aviation Administration, the Port of New York and New Jersey Authority, and the Aviation Development Council of New York have pursued an active program of improving the preferential runway system at John F. Kennedy International Airport (JFK). This effort culminated in the development and installation of a Dynamic Preferential Runway System (DPRS), which was designed to break up long periods of continuous community exposure to aircraft overflight while still distributing overflight among communities as equitably as possible. The installation and operation of the DPRS is described in an earlier report. (AD-787 713). This report presents a quantitative analysis of the effect of the DPRS on operations at JFK for August and September of 1972. (Modified author abstract)

Edmiston, RD Williamson, DG

Tracor Sciences and Systems, Federal Aviation Administration TRA-COR-T74-AU-9579-U, Sept. 1974, 83 pp

Contract DOT-FA71EA-6355

ACKNOWLEDGMENT: NTIS (AD-787709/5ST)  
ORDER FROM: NTIS

AD-787709/5ST

08 080175

**INSTALLATION AND OPERATION OF A DYNAMIC PREFERENTIAL RUNWAY SYSTEM, JFK INTERNATIONAL AIRPORT, JAMAICA, NEW YORK**

The object of the DPRS (Dynamic Preferential Runway System) is to break up long periods of continuous community exposure to aircraft overflight with periods of respite, while still distributing overflight as equitably as possible. A community disturbance model is described which forms the basis of determining when to break an exposure period. This model considers each operation occurring, giving appropriate weight to the more disturbing night and evening operations, adjusting for increased community sensitivity during weekends and on holidays, and accounting for the number of people exposed and the intensity of the exposure. (Modified author abstract)

Edmiston, RD

Tracor, Incorporated, Federal Aviation Administration, (TRACOR-076-158) TRACOR-T71-AU-9306-U, Mar. 1972, 46 pp

Contract DOT-FA71EA-6355

ACKNOWLEDGMENT: NTIS (AD-787712/9ST)  
ORDER FROM: NTIS

AD-787712/9ST

08 080176

**A COMPARISON OF THE EXPERIMENTAL DYNAMIC PREFERENTIAL RUNWAY SYSTEM WITH THE MANUAL PREFERENTIAL SYSTEM AT JOHN F. KENNEDY INTERNATIONAL AIRPORT**

The (DPRS) Dynamic Preferential Runway System, an experimental system developed and installed by TRACOR, was designed to break up long periods of continuous community exposure to aircraft overflight, while still distributing overflight as equitably as possible. A quantitative analysis of the operational effect of the experimental DPRS was performed on two months of operational data. The number of overflights and time of continuous exposure were tabulated for each of four community sectors surrounding JFK with respect to time of day and month. These tabulations were compared with those which would have resulted if FAA Kennedy Tower Bulletin 69-1 had been used to assign runways. The experimental DPRS was seen to substantially redistribute exposure patterns, although affecting less than 20% of all operations, resulting in much more equitable exposure for each community area. (Author)

Edmiston, RD

Tracor, Incorporated, Federal Aviation Administration, (TRACOR-076-158) TRACOR-T72-AU-9117-U, July 1972, 74 pp

Contract DOT-FA73EA-7400

ACKNOWLEDGMENT: NTIS (AD-787713/7ST)  
ORDER FROM: NTIS

AD-787713/7ST

08 080276

**EFFECTS OF VARIOUS RUNWAY LIGHTING PARAMETERS UPON THE RELATION BETWEEN RUNWAY VISUAL RANGE AND VISUAL RANGE OF CENTERLINE AND EDGE LIGHTS IN FOG**

Thirty six students and 54 commercial airline pilots were tested in the fog chamber to determine the effect of runway edge and centerline light intensity and spacing, fog density, ambient luminance level, and lateral and vertical offset distance of the subject from the runway's centerline upon horizontal visual range. These data were obtained to evaluate the adequacy of a balanced lighting system to provide maximum visual range in fog viewing both centerline and runway edge lights. The daytime system was compared against two other candidate lighting systems; the nighttime system was compared against other candidate lighting systems. The second objective was to determine if visual range is affected by lights between the subject and

the farthestmost light visible through the fog. The third objective was to determine if college student subjects differ from commercial airline pilots in their horizontal visual range through fog. Two studies were conducted.

Haines, RF

Ames Research Center, Federal Aviation Administration Final Rpt. Dec. 1973, 76 pp

Contract DOT-FA73WAI-346

ACKNOWLEDGMENT: NTIS (AD-785320/3)  
ORDER FROM: NTIS

AD-785320/3

08 080277

**AN ADVANCED AIR TRAFFIC MANAGEMENT CONCEPT BASED ON EXTENSIONS OF THE UPGRADED THIRD GENERATION ATC SYSTEM. SYSTEM B: AIRPORT CAPACITY ANALYSIS**

The report gives the analysis of IFR runway capacity constraints for twenty nine primary high density airports. These airports were examined during the course of the Advanced Air Traffic Management System B study. The mathematical model used to determine IFR runway capacity takes into account the runway configuration, approach control delivery precision, aircraft performance characteristics, aircraft safety separation standards, runway occupancy rule, departure/arrival spacing and departure/departure spacing. The analysis shows that thirteen of the twenty nine airports will be capacity limited in 1995.

See also Series 5, AD-785 311 and Series 7, AD-785 312.

Iyer, RR Goldman, D

Mitre Corporation, Federal Aviation Administration MTR-6419-Ser-6, Sept. 1973, 62 pp

Contract DOT-FA70WA-2448

ACKNOWLEDGMENT: NTIS (AD-785334/4)  
ORDER FROM: NTIS

AD-785334/4

08 080640

**DYNAMIC RESPONSE OF AIRPLANES IN GROUND OPERATION**

This investigation deals with deterministic and stochastic analyses of dynamic response of airplanes to runway unevenness. After a brief review of various methods for runway unevenness representation, a new approach of power spectral representation of sectional ergodic runway is presented. This new method, while keeping the computational expediency of power spectral density techniques, has the important feature that the local uneven nature of runways can be revealed. Two complementary approaches are used to obtain dynamic response. They are time-history analysis and power spectral analysis. The mathematical idealization of airplanes used in analysis can take account of the nonlinear behavior of the landing gear systems and the flexural nature of the free-free airframe. The analysis of the dynamic response of the Boeing 707 airplane to a severely uneven runway is taken as an example solution in order to illustrate some applications of the methods. Finally, some of the more significant findings of this investigation are summarized.

Hsueh, T Penzien, J (California University, Berkeley) *ASCE Journal of Transportation Engineering* Vol. 100 No. TE3, Proc. Paper 10755, Aug. 1974, pp 743-756, 15 Fig., 5 Ref., 2 App.

ORDER FROM: ESL

08 090395

**FEASIBILITY OF REAL TIME SIMULATION OF AIRPORT/AIRSIDE OPERATIONS**

This study is of real time simulation (RTS), or man-in-the-loop simulation. It is a part of a total study which includes the development of the following three classes of tools to estimate airfield performance and to determine means of maximizing the performance: Analytical models, fast time simulation, and real time simulation. The proposed real time simulation will provide an economical technique to evaluate the impact, from a controller's viewpoint, or proposed changes in an airfield, ATC hardware, and/or ATC procedures.

O'Neill, JB White, RT  
Douglas Aircraft Company, Incorporated, Federal Aviation  
Administration, (FAA-45325) Summary DAC-88277, Mar. 1975, 41 pp

Contract DOT-FA72WA-2897

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD/A-006996/3ST

08 090717

## APPLICATION OF MODERN CONTROL THEORY TO SCHEDULING AND PATH-STRETCHING MANEUVERS OF AIRCRAFT IN THE NEAR TERMINAL AREA

A design concept of the dynamic control of aircraft in the near terminal area is discussed. An arbitrary set of nominal air routes, with possible multiple merging points, all leading to a single runway, is considered. The system allows for the automated determination of acceleration/deceleration of aircraft along the nominal air routes, as well as for the automated determination of path-stretching delay maneuvers. In addition to normal operating conditions, the system accommodates: (1) variable commanded separations over the outer marker to allow for takeoffs and between successive landings and (2) emergency conditions under which aircraft in distress have priority. The system design is based on a combination of three distinct optimal control problems involving a standard linear-quadratic problem, a parameter optimization problem, and a minimum-time rendezvous problem. (Author)

Athans, M  
Massachusetts Institute of Technology NASA-CR-142058, ESL-R-574,  
Oct. 1974, 28 pp

Contract NGL-22-009-124

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

N75-15626/5ST

08 092175

## AIRPORT SURFACE TRAFFIC CONTROL SYSTEMS DEVELOPMENT ANALYSIS -EXPANDED

A previous MITRE Technical Report, Airport Surface Traffic Control Systems Deployment Analysis, FAA-RD-74-6, presented an analysis of ASTC (Airport Surface Traffic Control) system requirements and developed estimates of the deployment potential of proposed ASTC system alternatives for 19 air carrier airports. The primary requirement was determined to be improved surveillance which resulted in an estimated deployment of one of two surveillance systems at 16 airports by 1980. This report presents an expansion of that deployment analysis to include a total of 39 air carrier airports. The methods and assumptions for the deployment analysis of the 20 airports presented in this report are essentially the same as in the initial report. The overall result of the analysis is that by the initial deployment date (1976-1980) of the two alternative surveillance systems, the total potential market will be for 20-25 systems. By the end of the century, the total potential market for ASTC surveillance systems will exceed 30.

See also report dated Jan 74, AD-773 699.

Bales, RA Koetsch, JF  
Mitre Corporation, Federal Aviation Administration, Transportation  
Systems Center Final Rpt FAA-RD-75-51, Mar. 1975, 115 pp

Contract DOT/TSC-RA-73-11

ACKNOWLEDGMENT: NTIS  
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AD-A013579/8ST

08 092377

## RUNWAY FRICTION CHANGES DUE TO HIGH-PRESSURE WATER-JET CLEANING OPERATIONS, HOUSTON INTERCONTINENTAL AIRPORT, HOUSTON, TEXAS

The subject effort was to evaluate a new method of removing rubber from airport runways in terms of its effect on runway surface friction. This rubber removal method consisted of jetting water at high velocities to remove the rubber deposits from the surface. The results of the tests indicated that the contractor's equipment and method of operation removed all the above-the-surface rubber deposits, did not visibly damage the runway

surface, and increased friction in the rubber-laden aircraft touchdown areas. (Author)

Hiering, WA Grisel, CR  
National Aviation Facilities Experimental Center, Federal Aviation Admin-  
istration Intrm Rpt. FAA-RD-75-129, FAA-NA-75-20, Sept. 1975, 21 pp

ACKNOWLEDGMENT: NTIS  
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AD-A014641/5ST

08 093584

## CHICAGO O'HARE INTERNATIONAL AIRPORT CAPACITY ANALYSIS

A task force comprised of representatives from the FAA, airlines and the City of Chicago was formed in December of 1974 to study the present and future capacity and delay of the Chicago O'Hare International Airport. The task force effort concentrated on two future air traffic control environments. One consisting of (a) Basic Metering and Spacing, (b) Wake Vortex Predictive System; the other consisting of (a) Advanced Metering and Spacing, (b) Discrete Address Beacon System, and (c) Wake Vortex Predictive System. In support of the task force effort, the Airport Design Branch of SRDS has conducted a capacity analysis using January 1975 schedule information to determine the present and future capacities of the airport.

Ball, CT  
Federal Aviation Administration, (FAA-082-421) Final Rpt.  
FAA-RD-75-205, Nov. 1975, 22p

ACKNOWLEDGMENT: NTIS  
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AD-A018849/OST

08 093888

## AN OVERVIEW OF AIRPORT SURFACE TRAFFIC CONTROL-PRESENT AND FUTURE

The Airport Surface Traffic Control System, an integral part of the nation's Air Traffic Control System, is specifically concerned with the safe and efficient control of airport airside surface traffic. The current status of airport surface traffic control in the United States is summarized, and the most important of the planned system improvements are presented.

Hagerott, RE  
Transportation Systems Center, Federal Aviation Administration Final  
Rpt. FAA-RD-75-144, TSC-FAA-75-20, Sept. 1975, 44 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

AD-A019157/7ST

08 094531

## AIRPORT SURFACE TRAFFIC CONTROL CONCEPT FORMULATIONS STUDY, VOLUME I, EXECUTIVE SUMMARY

This four-volume report presents system concepts for use in semi-automated airport surface traffic control at all positions in the tower cab of the major airports. The control functions and data requirements of a Ramp Control System, a ground Control System, and a Local Control System are presented. The concept development process has been based upon an extensive study of cab operations at O'Hare Airport. This effort has included extensive delay analysis, study of communication tapes, and personal observations of the widely-varying situations that are faced by tower controllers. Following the Operations Analysis effort, a detailed study of requirements was performed and is presented in Volume IV of this report. This requirements effort provided an estimate of the performance requirements of a surveillance sensor that would be required in a TAGS (Tower Automated Ground Surveillance) system for use in both good and poor visibility conditions. Detailed studies were made of the complex type of conflicts to be solved by both the Ground and Local Controllers and operational levels and densities were developed. One particular TAGS system concept (employing an ATRBS Trilateration Surveillance Subsystem) is described in Volume I and an estimate is made of its deployment potential at major airports. Backup material on this concept in the form of a working paper is held by TSC. This working paper also includes synthetic digital display concepts for the three systems which have been summarized in Volume I. (Author)



D'Alessandro, F Heiser, W Knights, G Monteleon, P Reffelt, R  
Computer Sciences Corporation Final Rpt. FAA-RD-75-1201, July 1975,  
79 pp

Contract DOT-TSC-678

ACKNOWLEDGMENT: NTIS  
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AD-A022026/9ST

08 094536

**AIRPORT SURFACE TRAFFIC CONTROL CONCEPT  
FORMULATION STUDY. VOLUME II. OPERATIONS ANALYSIS  
OF O'HARE AIRPORT-PART I**

The report describes the approach followed and the analysis techniques employed in the performance of the operations analysis of the current ASTC system for the baseline airport, O'Hare International Airport, Chicago, Illinois. It also describes the data resulting from this analysis to draw conclusions on the effectiveness of the current ASTC system operations at O'Hare and on the effectiveness of the system in projected future operational environments at O'Hare.

See also Volume 3, AD-A022 104 and Volume 1, AD-A022 026.

D'Alessandro, F Heiser, W Knights, G Monteleon, P Reffelt, R  
Computer Sciences Corporation, Federal Aviation Administration,  
Transportation Systems Center Final Rpt. FAA-RD/TSC-75-120-3, July  
1975, 219 pp

Contract DOT-TSC-678

ACKNOWLEDGMENT: NTIS  
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AD-A022103/6ST

08 094537

**AIRPORT SURFACE TRAFFIC CONTROL CONCEPT  
FORMULATION STUDY. VOLUME III. OPERATIONS  
ANALYSIS OF O'HARE AIRPORT-PART II**

The volume presents the results of the quantitative analyses of the O'Hare ASTC System operations. The operations environments for the periods selected for detailed analysis of the ASDE films and controller communications recording are described. Following this, results of the data analyses are presented for the areas of: (1) Aircraft flow analysis, including traffic flow statistics for the ramp, ground taxi, and local control areas; (2) Controller workload analysis, both communications and non-communications; and, (3) Cockpit crew workload analysis, both communications and non-communications. The volume also presents the results of the operations effectiveness analysis for the current O'Hare ASTC system and for the projected future operating environment at O'Hare. The results for the current system include both quantitative and qualitative analysis of the operations observed using the data derived from the functional activity analysis of system operation. The salient findings of this study effort and the conclusions and recommendations derived from these findings are presented.

See also Volume 2, AD-A022 103 and Volume 4, AD-A022 105.

D'Alessandro, F Heiser, W Knights, G Monteleon, P Reffelt, R  
Computer Sciences Corporation, Federal Aviation Administration,  
Transportation Systems Center Final Rpt. FAA-RD-75-120-3, July 1975,  
280 pp

Contract DOT-TSC-678

ACKNOWLEDGMENT: NTIS  
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AD-A022104/4ST

08 094538

**AIRPORT SURFACE TRAFFIC CONTROL CONCEPT  
FORMULATION STUDY. VOLUME IV. ESTIMATION OF  
REQUIREMENTS**

A detailed study of requirements was performed and is presented. This requirements effort provided an estimate of the performance requirements of a surveillance sensor that would be required in a TAGS (Tower Automated Ground Surveillance) system for use in both good and poor visibility conditions. Detailed studies were made of the complex type of conflicts to be solved by both the Ground and Local Controllers and operational levels and densities were developed.

See also Volume 3, AD-A022 104.

D'Alessandro, F Heiser, W Knights, G Monteleon, P Reffelt, R  
Computer Sciences Corporation, Federal Aviation Administration,  
Transportation Systems Center Final Rpt. FAA-RD-75-120-4,  
DOT-TSC-FAA-75-8-V4, July 1975, 239 pp

Contract DOT-TSC-678

ACKNOWLEDGMENT: NTIS  
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AD-A022105/1ST

08 096281

**A POLYNOMIAL OPTIMISATION TECHNIQUE FOR  
IMPROVING THE VERTICAL ALIGNMENT OF AN EXISTING  
AIRPORT RUNWAY**

The main elements of the problem are identified and a simplified flowchart is used to describe the computer system which contains 12 separate programs. Two typical cross sections with an exaggerated vertical scale are used to describe cross section optimization. Basic concepts of longitudinal section optimization are examined and the theory is developed. Limitations to the longitudinal optimization program are noted.

Presented at Seminar X (Road Design 1: General Topics) of the PTRC Summer Annual Meeting, Warwick University, England, 8-12 July 1974.

Stickling, RW (Torrey, County Borough of, England)  
Planning and Transport Res and Computation Co Ltd PTRC/P/108,  
July 1974, pp 54-72, 8 Fig.

ORDER FROM: Planning and Transport Res and Computation Co Ltd, 167  
Oxford Street, London W1, England

08 127693

**CRITERIA DEVELOPMENT TO EVALUATE RUNWAY  
ROUGHNESS**

The progression of a study to develop criteria for the evaluation of runway roughness (or unevenness) is traced. As experiment is explained in which two runways are evaluated for roughness using the subjective ratings of airplane pilots and the analysis of the runway surface profiles as measured by the Surface Dynamics Profilometer. A characteristics response frequency of aircraft that use the runways is calculated, combined with information on amplitudes of waves in sections of the runways used, and compared with the pilots' ratings. The data analyzed in this study showed that the subjective ratings of pilots indicated poorer riding qualities as the average amplitudes of resonant wavelengths increased. /ASCE/

McCullough, BF (Texas University, Austin) Steitle, DC (Smith  
(Wilbur) and Associates) *ASCE Journal of Transportation Engineering*  
Proceeding Vol. 101 No. TE2, ASCE #11333, May 1975, pp 345-363, 5  
Fig., 3 Tab., 15 Ref., 2 App.

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08 128751

**A SYSTEMS ANALYSIS PROCEDURE FOR ESTIMATING THE  
CAPACITY OF AN AIRPORT: SYSTEM DEFINITION, CAPACITY  
DEFINITION AND REVIEW OF AVAILABLE MODELS**

This research effort which defines the airport system with the aid of a flow chart and reviews available models for analyzing airport capacity, provides an airport capacity estimation method with which balanced improvements to airside and landside components can be planned through the use of a systems approach rather than the current method of analyzing each component as an independent part of the airport-system. Airport capacity analysis requires a hierarchical procedure in which subsystem interactions at the major interface components are considered first, followed by analysis of component interactions within each subsystem. Level of service concepts are used in order to include qualitative as well as quantitative measures of the service provided by the airport.

Chambers, EV, III Chmores, T Dunlay, WJ, Jr Gualda,  
NDF McCullough, BF Park, CH Zaniewski, J  
Texas University, Austin Res. Memo #27, Oct. 1975, 60 pp, 7 Fig., 2  
Tab., 100 Ref.

08 131171

## INFLUENCE OF AIRSIDE AND OFF-AIRPORT FACTORS ON LANDSIDE CAPACITY

This report identifies the objectives of Workshop 4, which are as follows: (1) identify all airside and off-airport factors that influence landside requirements; (2) determine the relative importance of such factors with respect to airport landside capacity and level-of-service objectives; and (3) recommend a research and development program that will promote coordination of airside, landside, and off-airport activities. Workshop 4 identified 13 airside factors and 5 off-airport factors that influence airport landside capacity. The research and development recommendations of Workshop 4 are oriented toward socioeconomic research and compilations of the state of the art. The airside and off-airport factors influencing capacity are broadly categorized as technical or nontechnical. The recommendations to relieve constraints on balancing and expanding airport landside capacity pertain to the nontechnical areas, such as the management of transport systems, their financing, and the review of their environmental impact.

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

Paullin, R.L. (Department of Transportation) *Transportation Research Board Special Reports* No. 159, 1975, pp 189-195, 1 Fig.

ORDER FROM: TRB Publications Off

08 137276

## TERMINAL AREA FORECAST-1977-1987

The report contains forecasts for air carrier and air taxi enplanements, air carrier and air taxi aircraft operations, itinerant, total and instrument aircraft operations, and instrument approaches at 872 airports throughout the United States. The airports in this publication include all those with Federal Aviation Administration air traffic control towers and those with air carrier service. The report is intended as an aid for anticipating future manpower and equipment needs at terminal areas.

See also report dated Sep 75, AD-A017 095.

Federal Aviation Administration FAA-AVP-76-5, Jan. 1976, 335 pp

ACKNOWLEDGMENT: NTIS

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AD-A026753/4ST

08 143307

## A HANDBOOK FOR THE ESTIMATION OF AIRSIDE DELAYS AT MAJOR AIRPORTS (QUICK APPROXIMATION METHOD)

The handbook contains a set of curves that allow estimation of the average number of total daily delay minutes at a major airport under a variety of conditions. Demand profiles at each airport are classified with respect to the number of daily peak periods, the percentage of daily flights during peak periods, and the number of peak period operations at the airport. When combined with the saturation capacity of the airport, these descriptors provide sufficient information to allow usage of the handbook. Examples illustrating the use of the handbook are provided, as well as a brief review and description of the technical approach and of the computer package developed for this purpose. (Author)

Odoni, AR. Kivestu, P  
Massachusetts Institute of Technology NASA-CR-2644, June 1976, 83 pp

Grant NSG-1123

ACKNOWLEDGMENT: NTIS

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N76-26148/6ST

08 144312

## AIRPORT STRATEGY FOR GREAT BRITAIN. PART 1: THE LONDON AREA

Consultations on the way future United Kingdom air traffic should be handled are reviewed, and the details are discussed of studies relating to air traffic forecasts, aircraft noise, planning and environmental implications, and regional airport development. Forecasts for international and domestic passenger and cargo traffic at the London airports are forecast and the impact of higher fuel prices on air transport are considered. A wide range of measures to divert traffic were examined and four measures were chosen

for detailed appraisal by an airport traffic allocation model. When improvements already planned are completed, the capacity of London area airports will be about 50 million passengers per year. Larger term airport developments are also indicated. Noise studies are reported in which the Noise and Number Index (NNI) were used to assess noise disturbances. The airport developments were also examined in relation to site considerations, possible access, employment and planning consequences.

Prepared by the Department of Trade, England.

Her Majesty's Stationery Office 1975, 78 pp, Figs., Tabs., 6 App.

ORDER FROM: Her Majesty's Stationery Office, 49 High Holborn, London WC1V 6HB, England

08 144313

## AIRPORT STRATEGY FOR GREAT BRITAIN. PART 2: THE REGIONAL AIRPORTS

This report reviews airport policy, and considers the future prospects of the main regional airports outside the London area and the possibilities for diverting air traffic to them from London. The total level of air passenger demand at airports in Great Britain in 1990 outside the London area is predicted to lie within 23-32 million. Three principal elements are recognized in the establishment of a framework for delineating more sharply the roles of regional airports: the concentration of air services, especially international scheduled services, at certain regional airports; identification of those airports at which growth of regional traffic may be concentrated; and the development of policies both in relation to the provision of air services and otherwise, consistent with a policy of concentration. A wide range of measures to divert passenger traffic to regional airports are considered. Groundside implications of airport developments are reviewed, and English, Welsh and Scottish airports are discussed. The future ownership and financing of regional airports are also considered.

Prepared by the Department of Trade, England.

Her Majesty's Stationery Office June 1976, 139 pp, Figs., Tabs., 9 App.

ORDER FROM: Her Majesty's Stationery Office, 49 High Holborn, London WC1V 6HB, England

08 146689

## TECHNICAL REPORT ON AIRPORT CAPACITY AND DELAY STUDIES

This report contains documentation of the technical studies leading to the preparation of an airfield capacity and delay handbook for the Federal Aviation Administration. The effort was divided into four major areas: (1) Introduction, including definitions of airfield capacity and delay; (2) Airfield capacity and delay models; (3) Validation of capacity and delay models; and (4) Handbook development, including technical studies, presentation concepts, and production. (Author)

Prepared in cooperation with Peat, Marwick, Mitchell and Co., San Francisco, Calif., McDonnell Douglas Automation, Co., Long Beach, Calif. and American Airlines, Inc., New York, N. Y.

Douglas Aircraft Company, Incorporated Final Rpt. FAA-RD-76-153, DAC-88277, June 1976, 186 pp

Contract DOT-FA72WA-2897

ACKNOWLEDGMENT: NTIS

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AD-A032166/1ST

08 147279

## TECHNIQUES FOR DETERMINING AIRPORT AIRSIDE CAPACITY AND DELAY

This report contains procedures for determining the capacity of the airfield and its components and for determining delays to aircraft operating on the airfield. This report is structured to permit the user to choose the method of analysis most suited to the complexity of the user's problem or the level of detail desired.

Prepared in cooperation with Peat, Marwick, Mitchell and Co., San Francisco, McDonnell Douglas Automation Co., Long Beach, Calif. and American Airlines, Inc.

Douglas Aircraft Company, Incorporated, (FAA-082-421) Final Rpt. FAA-RD-74-124, June 1976, 239 pp

Contract DOT-FA72WA-2897

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AD-A032475/6ST

08 150729

# **MODEL USER'S MANUAL FOR AIRFIELD CAPACITY AND DELAY MODELS. BOOK 1**

The FAA has developed a family of computer models for the analyses of the airside of an airport. These models can be used to determine the capacity and delay on airports, and to study the fine-grain sensitivity of capacity and delay to variations of airport specific conditions. This model users manual presents detailed instructions for using the FAA capacity and delay models. The manual is written primarily for airport planners and engineers who have a general familiarity with computer operations and who wish to apply these models to airport studies. (Author)

Ball, CT  
Federal Aviation Administration Final Rpt. FAA-RD-128-BK-1, Nov. 1976, 305 pp

ACKNOWLEDGMENT: NTIS  
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AD-A033685/9ST

08 150853

# **SUPPORTING DOCUMENTATION FOR TECHNICAL REPORT ON AIRPORT CAPACITY AND DELAY STUDIES**

This Report contains technical data to supplement the report "Technical Report on Airport Capacity and Delay Studies." The report contains supporting documentation of the technical studies leading to the preparation of an airfield capacity and delay handbook for the Federal Aviation Administration. (Author)

Supplement to Rept. no. FAA-RD-76-153, AD-A032 166. Prepared in cooperation with Peat, Marwick, Mitchell and Co., San Francisco, Calif., McDonnell Douglas Automation Co., Long Beach, Calif. and American Airlines, Inc., New York, N. Y.

Douglas Aircraft Company, Incorporated Final Rpt. FAA-RD-76-162, DAC-88277-Suppl, June 1976, 57 pp

Contract DOT-FA72WA-2897

ACKNOWLEDGMENT: NTIS  
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AD-A032526/6ST

08 151570

# **EXPERIMENTS WITH THE RVR-CONVERTER AT DIFFERENT CONDITIONS OF BACKGROUND LUMINANCE [Experimenten met de RVR-Converter bij Verschillende Achtergrondhelderheden]**

Runway visual range (RVR) values were determined, under varying background luminance conditions, using the RVR converter. The measurements were made to compare the dependency of the RVR on both the transmission of light through the atmosphere and the background luminance under night, day, and twilight conditions. Some theoretical aspects of the RVR concept are dealt with and the components and operation of the RVR converter are described. The measured RVR values are compared with the values specified by the Royal Netherlands Meteorological Institute (KNMI). It is concluded that under daylight and twilight background luminance conditions the measured values are in good agreement (within 50 m) with the KNMI specifications. At night there is a good agreement between 400 and 1000 m; above 1000 m RVR the maximum deviation is 150 m. [Dutch]

Cannemeijer, F Dejongh, JP  
Royal Netherlands Meteorological Institute KNMI-WR-76-3, 1976, 29 pp

ACKNOWLEDGMENT: NTIS  
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N77-10040/2ST

08 154295

# **TEST AND EVALUATION OF AN ENROUTE SYSTEM TERRAIN-AVOIDANCE FUNCTION WITH THE NAS A3D2.1 SYSTEM**

This report describes the operational evaluation of an enroute system terrain-avoidance function in conjunction with the National Airspace System Enroute A3d2.1 system. Tests were conducted at the National Facilities Experimental Center, Atlantic City, New Jersey, in a low-altitude environment with simulated digital target data. Tests were designed to evaluate the performance of the terrain-avoidance function with respect to detection capability and adequacy of warning provided. Results indicate that although the terrain-avoidance function performed adequately for most enroute situations, false or late alerts could occur, due to the lag between the terrain-avoidance vector line and true aircraft heading. In most instances, the displayed information could be immediately and correctly interpreted by air traffic controllers and relayed to the pilots in adequate time for a safe response. Several functional changes made to the terrain-avoidance program to prevent problems encountered during testing were not subjected to detailed verification, thereby indicating a need for further testing of the function. Although these problems were encountered, the desirability of having a terrain-avoidance function as part of the enroute National Airspace System was not derogated. (Author)

Ranger, FW  
National Aviation Facilities Experimental Center Intrm Rpt.  
FAA-RD-77-14, FAA-NA-76-35, Feb. 1977, 15 pp

ACKNOWLEDGMENT: NTIS  
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AD-A036441/4ST

08 154296

# **RADAR STATION EVALUATION REPORT, HOLLOMAN AFB, NEW MEXICO, 8-27 SEPTEMBER/7-15 OCTOBER 76**

This traffic control and landing systems (TRACALS) radar station evaluation report presents data collected to define the capabilities and limitations of the radar approach control (RAPCON) facility at Holloman AFB, New Mexico. The data presented in this report were collected during two evaluation periods: 8 through 27 September 1976, and 7 through 15 October 1976. The RAPCON facility is comprised of AN/FPN-47 airport surveillance radar (ASR), AN/TPX-42 (A)V Type III air traffic control radar beacon system (ATCRBS), AN/FPN-16 precision approach radar (PAR), and associated power and communications systems. This report includes descriptions of the useable radar coverage, the radar coverage diagrams, the ATCRBS coverage and tracking capabilities, the analysis of flight and equipment performance data, and the performance predictions for the ASR, ATCRBS, and PAR systems. The data presented in this report are a guide for anticipated equipment performance until there is an addition, deletion, or relocation of equipment, or until a change occurs in the horizontal profile. (Author)

Chaumont, RC  
Air Force Facility Checking Squadron Final Rpt. 76/66R-79, Feb. 1977, 120 pp

ACKNOWLEDGMENT: NTIS  
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AD-A036439/8ST

08 154306

# **NAVAID SUPPORT OF HIGH-ALTITUDE AREA NAVIGATION ROUTES**

A study was conducted to determine the capability of the present system of navigational aids (NAVAID's) to support an area navigation (RNAV) route structure. Coverage contours for each NAVAID were derived through application of radio line-of-sight (LOS) angles from the antenna to the surrounding terrain. A hypothetical high altitude RNAV structure was tested against the coverage contours of the NAVAID's presently used in the airspace at 18,000 feet and above. Each parent route and its related parallel offsets were checked for areas of excessive route width as well as for areas of noncoverage at a flight altitude of 18,000 feet. Based on these results, it is concluded that the present NAVAID system will support a high altitude RNAV route structure with only minor problems, principally in connection with route widths. But the extent of this problem depends upon air traffic control requirements and the assumed cross-course navigational errors.



With definite information regarding these factors, the methodology developed at NAFEC can be effectively used to isolate and identify specific NAVAID coverage problems.

Halverson, AG Woodson, FB  
National Aviation Facilities Experimental Center Intrm Rpt.  
FAA-RD-76-210, FAA-NA-76-49, Feb. 1977, 121 pp

ACKNOWLEDGMENT: NTIS  
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AD-A036388/7ST

## 08 154310 MODEL USERS' MANUAL FOR AIRFIELD CAPACITY AND DELAY MODELS. BOOK 2

This report contains examples for the Delay Simulation Model described in Chapter 4 of 'Model Users' Manual for Airfield Capacity and Delay Models' FAA-RD-76-128 Book 1, dated November 1976 (AD A033 685). (Author)  
See also Book 1, Ad-A033 685.

Ball, CT  
Federal Aviation Administration Final Rpt. FAA-RD-76-128-Bk2, Nov.  
1976, 173 pp

ACKNOWLEDGMENT: NTIS  
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AD-A036354/9ST

## 08 154336 WORKLOAD OF THE RADAR-AIR TRAFFIC CONTROLLERS AT SCHIPHOL [Interimrapport werkbelasting radar-luchtverkeersleiders Schiphol]

The workload at the Amsterdam airport was measured with a view to analyzing mental load factors and to studying the effect of task performance on the air traffic controller. Number and content of the air traffic information strips, radio telephony communication, coordination with other air traffic sectors, and telephone calls with other air traffic control centers were registered for five air traffic controllers during the week of Aug. 6, 1973. The results of the task analysis parameters were evaluated and preliminary conclusions were made. [Dutch]

Pasmooij, CK  
Nederlands Instituut voor Praeventieve Geneeskunde Intrm Rpt. IR-1,  
June 1975, 29 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

N77-13651/3ST

## 08 154355 VISUAL APPROACH SLOPE INDICATORS. PRINCIPLES OF OPERATION, RECOMMENDATIONS FOR INSTALLATION AND MAINTENANCE

Installation and maintenance instructions for Visual Approach Slope Indicators are presented. This system is a precision aircraft approach and landing aid for day and night use, either stand-alone or in conjunction with radio and instrument aids. To fulfill the precision requirements, the system must be designed, set out, installed, and commissioned to a high degree of accuracy, as recommended.

Philips Gloeilampenfabrieken N.V. PHILIPS-ER-12, Aug. 1975, 44 pp

ACKNOWLEDGMENT: NTIS  
ORDER FROM: NTIS

N77-13040/9ST

## 08 154726 ILS GLIDE SLOPE PERFORMANCE PREDICTION MULTIPATH SCATTERING

A mathematical model has been developed which predicts the performance of ILS glide slope systems subject to multipath scattering and the effects of irregular terrain contours. The model is discussed in detail and then applied to a test case for purposes of illustration. A complete listing of all computer programs has been appended to the report. A user's manual has been prepared under separate cover. (Author)

Martin, S Newsom, D Scotto, M

Transportation Systems Center Final Rpt. FAA-RD-76-216,  
TSC-FAA-70-16, Dec. 1976, 80 pp

ACKNOWLEDGMENT: NTIS  
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AD-A035298/9ST

## 08 154739 ADVANCED PRODUCTIVITY ANALYSIS METHODS FOR AIR TRAFFIC CONTROL OPERATIONS

This report gives a description of the Air Traffic Control (ATC) productivity analysis methods developed, implemented, and refined by the Stanford Research Institute (SRI) under the sponsorship of FAA and TSC. Two models are included in the productivity analysis methodology. The first is the Relative Capacity Estimating Process (RECEP) that models the traffic handling capabilities of individual ATC sectors in terms of routine, surveillance, and conflict-processing workloads. The second model is the Air Traffic Flow (ATF) model that simulates a multisector ATC network by tracing aircraft flows from sector to sector; and measuring traffic loadings, workload requirements, and delays under given sets of traffic input parameters and congestion-relief strategy. The report covers the background and application experiences of the two models as well as technical descriptions of their input/output specifications, model structures, field data collection and reduction techniques, and potential model applications. Finally, a hypothetical example illustrating a typical RECEP/ATF application, together with post-simulation output analyses, are given. A general survey of other similar models and techniques, and their comparisons with RECEP and ATF, are also included in the report. (Author)

Tuan, PL Procter, HS Couluris, GJ  
Stanford Research Institute TSC-FAA-76-27, Dec. 1976, 197 pp

Contract DOT-TSC-1128

ACKNOWLEDGMENT: NTIS  
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AD-A035095/9ST

## 08 155456 SOME MEASURES OF AIRCRAFT PERFORMANCE ON THE AIRPORT SURFACE

This thesis presents the results of the analysis of data collected for input for an interactive computer simulation of runway and taxiway traffic. Sample means and deviations of various parameters are given. The results of further analysis, intended to disclose inherent patterns in the data, are also discussed. First, it was found that there were few statistically significant differences in the speeds of different aircraft over the same taxiway stretch, regardless of the aircraft type or direction of travel. Also, length of the segment did not seem to have a uniform effect on speed. It is felt, though, that the location of the segment does have a substantial influence on taxing speed. Secondly, touchdown distance was not significantly different on runways equipped with VASI (Visual Approach Slope Indicator) Systems, when compared with non-VASI runways. Both exhibit substantial variance in the distribution of touchdown points. However, the distribution for VASI-runways presents a double peaking not otherwise noticed, which may indicate a difference between a VASI-assisted and an unguided landing. Third, in analyzing runway occupancy times, it was found that the time to a given exit did not statistically vary, in general, regardless of the aircraft type involved. Overall differences between types were noted, with average occupancy times increasing with weight, but this is seen as being caused mainly by different patterns of exit use. On takeoffs, very few differences in occupancy times were found, regardless of type or runway. Lastly, other analyses which could be performed on the collected data are discussed, and suggestions are made for the planning of future surveys. In particular, a more automated data gathering system, involving remote sensors on the runway, is strongly recommended for greater accuracy.

Swedish, WJ  
Massachusetts Institute of Technology MS Thesis FTC Report R72-4,  
1972, 138 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155460

**AN ANALYTICAL STUDY OF ADVANCED TERMINAL AREA AIR TRAFFIC MANAGEMENT AND CONTROL**

The entire terminal area ATM/C System has been formulated as a feedback control system, with individual subsystems identified and described. The ground control system, which is one of the two major control elements in the system, has been studied in detail. Definitions, purposes, input, output, and the processing steps of the control functions in the ground control system have been discussed. Automation of these functions has been recommended. One of the control functions, namely, the path generation function has been presented to demonstrate the automation implementation. Formulated as a two point boundary values problem (TPBVP) of optimal control, solution techniques and numerical examples of the path generation problem have been presented. A Newton-Raphson Method of trajectory optimization has been used to carry on the computer simulation. Finally, a one-degree-of-freedom, speed control final approach problem has been presented to demonstrate the application of parametric error analysis to ATM/C System performance evaluation.

Hsin, CC

Massachusetts Institute of Technology FTL Report R76-13, Sept. 1976, 234 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155468

**ESTIMATES OF CAPACITY AND DELAY FOR PROPOSED RUNWAY SYSTEMS SCHIPHOL AIRPORT, AMSTERDAM**

The purpose of this report is to evaluate the capacity and delay implications of the proposed addition of a third parallel runway in the north-south direction at Schiphol Airport in Amsterdam. At present, Schiphol normally operates as a two runway airport with one runway used exclusively for takeoffs and the other for landings. With the proposed triple runway configuration, one of the outside runways would be used exclusively for takeoffs, the other, outside runway for landings, and the center runway would be used for both takeoffs, and landings. This report is aimed at: 1) providing an evaluation of the improvements in capacity and delay offered by this new runway configuration; 2) providing some indication of the future usage of the central runway as levels of airport activity increase; and 3) evaluating the crossing problem caused by operations on the new west runway which must cross the control runway when taxiing to and from the terminal area.

Odoni, AR Simpson, RW

Massachusetts Institute of Technology FTL R76-12, Dec. 1976, 110 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155471

**AIR TRAFFIC CONTROL: UPGRADING THE THIRD GENERATION**

The conclusions of a major technology assessment effort are discussed, and it is noted that the Upgraded Third Generation System (UG3RD) and extensions to it can handle air traffic control requirements to the end of the century. The UG3RD is now transformed into a broad based system design which is highlighted by 9 key features. The system will provide a ground based separation service, the Intermittent Positive Control (IPC), which will maintain surveillance on all aircraft and will transmit advisory collision avoidance instructions. UG3RD will incorporate a method of addressing or selectively interrogating discrete aircraft by the Discrete Address Beacon System. Integration and utilization of the area navigation (RNAV) in 2-, 3-, and 4-dimensional versions is a goal of the UG3RD. A new Microwave Landing System (MLS) is now under development, and an attempt will be made to achieve higher levels of automation in monitoring potential problems in metering of arriving aircraft etc. Airport surface traffic control, the wake vortex avoidance system, an automated flight service station, and aeronautical satellites for trans-ocean flights are other highlights discussed here.

Israel, DR (Federal Aviation Administration) *Technology Review* Vol. 77 No. 3, Jan. 1975, pp 14-25

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155474

**DENSITY ALTITUDE VARIATIONS AND RUNWAY LENGTHS**

This study was designed to determine the effect of considering variations in pressure altitude on required runway lengths and take-off weights. Meteorological data representing actual conditions at specific locations were examined and the recorded values of barometric pressure and temperature were used. Values of barometric pressure were then converted to pressure altitude and assumed values were used for take-off weight, runway slope, and wind. The required runway lengths resulting from computations for each aircraft in each airport were plotted on probability paper as families of curves. These curves were the source of data from which the conclusions were drawn. While variations in pressure altitude greater than 500 ft have been found to occur only infrequently, no published data are available showing the effect on runway lengths of pressure altitude. This study shows the magnitude of the effect of including pressure altitude.

Davinroy, TB (Pennsylvania State University, University Park) *ASCE Journal of Transportation Engineering* Vol. 93 No. TE3, Nov. 1971, pp 591-607

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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08 155476

**NON-VOICE CONTROL OF GENERAL AVIATION AIRCRAFT IN THE TERMINAL ENVIRONMENT**

The problem of maneuvering low performance general aviation aircraft through congested airspace around busy terminal areas using VFR "highways" is studied, with particular emphasis upon the use of processed radar data and data link for commands.

Wischmeyer, CE

Massachusetts Institute of Technology 1973, 90 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155478

**A SYSTEM OF TERMINAL AIR TRAFFIC CONTROL BASED ON THREE DIMENSIONAL AREA NAVIGATION**

This study explores the concept of a 3D non-intersecting tube area navigation (RNAV) Air Traffic Control system. A computerized method was developed for designing the tube structure for a complex multi-airport terminal area. The computer program first generates a large set of climb and descent tubes for each airport. These tubes have vertical profiles as close as possible to those recommended by aircraft manufacturers for the aircraft of the actual fleet mix. A measure of the desirability with respect to the aircraft fleet is associated with each tube. However, this set of tubes is mutually conflicting. A second program selects that subset of tubes which is completely non-conflicting and which has the maximum sum of the desirability factors of the selected tubes. The computerized design method was tested on the New York Terminal Area. The resulting tube structure was felt to meet not only the mathematical constraints but also projected operational considerations. These operational factors were discussed, and the system was compared with 2D, 3D with altitude stratification, and 4D RNAV. Certain advantages were found in the 3D tube-based system in terms of block time, fuel consumption, traffic flow rates, and pilot workload.

Tymczyszyn, JP

Massachusetts Institute of Technology 1975, 261 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155479

**COMPUTER ESTIMATES OF DELAYS AND DELAY COSTS AT CONGESTED AIRPORTS**

Using well known results from queueing theory, namely the queueing models M/M/K and M/D/K, this study provides computer estimates for statistics of interest at congested airports. For time varying demand rates these two queueing models are used to approximate the time dependent queueing statistics at airports. Special attention is paid to average waiting times and the resulting delay costs. The obtained results provide considerable insight into such phenomena as the strongly non-linear increase in waiting times during peaks in the demand distribution and the effects of additional demand during peak and non-peak periods. It is obvious that administrators of busy airports have to take into account these factors in determining pricing policies and landing fees.

AD-A049 879 NATIONAL ACADEMY OF SCIENCES WASHINGTON D C TRANSP--ETC F/G 1/5  
BIBLIOGRAPHY: AIRPORTS.(U)  
OCT 77 DOT-FA76WA-3872

NATIONAL ACADEMY OF SCIENCES WASHINGTON D C TRANSP--ETC F/G 1/5  
BIBLIOGRAPHY: AIRPORTS.(U)  
OCT 77 DOT-FA76WA-3872

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Hengsbach, H  
Massachusetts Institute of Technology MS Thesis 1974, 63 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

## 08 155486 DEVELOPMENTS IN AIRPORT CAPACITY ANALYSIS

Runway capacity is defined as the maximum number of aircraft operations that can be handled during a specific period of time, under given operating conditions. The most important determinants of capacity are the aircraft mix, the length of the common approach path, and the operating strategy. Aircraft are postulated to deviate from intended paths while approaching a runway to land. These deviations are assumed to be normally distributed random variables with zero means. In order to maintain the probability of violations of aircraft separation rules, controllers are assumed to introduce buffers between aircraft in order to absorb the randomness in their separations. A capacity model is constructed with these postulates. The model yields runway capacity for various operating strategies and permits the voice of the optimal strategy for a given and intended arrival-departure mix. The application of the model is demonstrated with data from New York's La Guardia Airport.

Hockaday, SLM (Peat, Marwick, Mitchell and Company) Kanafani, A (California University, Berkeley) *Transportation Research* Vol. 8 No. 3, Aug. 1974, pp 171-180

ACKNOWLEDGMENT: Massachusetts Institute of Technology

## 08 155487 DYNAMIC PROGRAMMING MODEL FOR OPTIMAL LOCATION OF RUNWAY EXITS

The time required by a landing aircraft to clear the runway depends, among other things, on the type and location of runway exits available. For any given runway arrival pattern, in particular the aircraft separation times, the distribution of runway occupancy times determines the probability that the aircraft next in line for landing will be waved off. Horonjeff et al. (1959) prove that in the limit the expected runway acceptance rate is a function of the wave-speed runway exists so as to maximize the expected runway acceptance rate for a bivariate normal distribution of runway deceleration distances and times. This note shows how this optimization can more efficiently be done by the use of dynamic programming for any arbitrary joint probability distribution of deceleration distances and time and any number of exits. The paper also explores several extensions to the basic model.

Daellenbach, HG (Canterbury University, New Zealand) *Transportation Research* Vol. 8 No. 3, Aug. 1974, pp 225-232

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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## 08 155493 AIR TERMINAL QUEUES UNDER TIME-DEPENDENT CONDITIONS

The present paper regards the queue-developing process as strongly time-dependent, often with a diurnal (24-hour) periodicity. The formation and treatment are entirely analytic and make use of machines only to solve the equations for the probabilities, by economical deterministic steps, using the coefficients as given in tabular form. Time-varying Poisson arrivals are assumed, and also an upper limit to queue length. Two laws of servicing are used: Poisson and fixed service time; these extremes are found to lead to numerically close results in the realistic case. This situation contrasts with the much cruder approximation of deterministic flow models. The stochastic equations belong to well studied types of differential or difference equations. When the coefficients have a 24-hour period, so does just one solution, all others approaching it. Actual airport statistics are made the basis of certain revealing computations. A perturbation method for treating multiple queues is outlined. The concrete results are exhibited as graphs.

Koopman, BO (Little (Arthur D), Incorporated) *Operations Research* Vol. 20 No. 6, Nov. 1972, 25 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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## 08 155498 DESIGN CONSIDERATIONS FOR AIRPORT LANDING SYSTEMS

The landing system is viewed as 4-servers in series, namely, the runway, the glide path, the regulator and the holding stacks, each having a particular capacity. A simplified landing system in which we have only one runway that is used exclusively for landings is considered. The concept of the Ideal Regulator (a regulator that accepts random arrivals, or the output from the holding stacks, and regulates this flow to match the demand made by the common glide path and the runway) is introduced and shown to be useful in the design of the landing system. From this point of view, the problem consists of computing the required number of holding stacks and glide paths, and their optimal configurations, for each runway, and of designing the regulator so that it will behave as an ideal regulator. Probabilistic models that permit the computation of the capacity of each server are fully described. In particular, the models for the approach trajectories of the regulator seem to be original.

Crousillat Velasco, C  
Massachusetts Institute of Technology 1971, 128 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

## 08 155499 A COMPUTER MODEL FOR DETERMINING RUNWAY CAPACITY

This report describes a computer program which models air traffic in the vicinity of airports, to be used for analyzing the efficiency of the operation of any given airport in terms of capacity, congestion, and delays. The program consists of an analytic model and a simulation model. The analytic model computes the capacity of a single runway used for either landings or takeoffs or both, or a pair of intersecting runways, one of which is used for landings, and the other for takeoffs. Inputs about the rules of operation and about aircraft characteristics must be supplied by the user. The simulation model traces the events around the runway for a specified period of time. Given the demand characteristics as input, the model "generates" aircraft and services them as appropriate. Statistics about delays and other parameters are computed.

Judem, RJ  
Massachusetts Institute of Technology 1973, 70 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

## 08 155500 ADVANCED COMMUNICATIONS: A TOOL FOR THE CONTROLLER

This article describes the TCSS as developed for Dallas-Fort Worth as an advanced application of frequency diversion techniques utilizing a system architecture which permits growth costs to accumulate linearly. Hence an air traffic control facility can be equipped with a basic TCSS when it is relatively small. Further growth and cost increments need only meet the immediate requirement because no additional common equipment is required as the system grows.

Tegeler, AE *Airports International* Feb. 1977, pp 17-32

ACKNOWLEDGMENT: Massachusetts Institute of Technology

## 08 155503 AIR CONGESTION AT MAJOR AIRPORTS IN THE NEXT DECADE

In this note, the conclusions of a brief recent study of future air-side operations at major commercial airports are summarized. The emphasis will be on venturing into some guesses regarding the severity of the terminal area problem in coming years based on a variety of traffic projections and some forecasts on airport capacity prospects. Three major approaches to relieving congestion at airports can be identified: (1) Improvement of the efficiency of conducting operations at presently existing runways. (2) Addition of new airports and runways to the ones already available. (3) Reduction or modification of the characteristics of the demand for the usage of runways. The prospects in all three of the above areas are examined with particular reference to items (2) and (3). Details of mathematical analysis will not be presented but a few results will be quoted and appropriate references will be provided.

Proceedings, 14th Annual Meeting, Transportation Research Forum, 1973.

Odoni, AR (Massachusetts Institute of Technology)  
Cross (Richard B) Company 1973, pp 483-503

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155505

#### STAGING OF IMPROVEMENTS TO AIR TRANSPORT TERMINALS

This paper examines the techniques used to determine the demand level at which the provision of an additional gate position at the Sydney International Terminal would be economically justified. The technique used was essentially a simulation technique. The operation of the apron area at the terminal was studied and simulated, and based upon forecasts of daily aircraft movements, the economic justification for an additional gate position was assessed. The size and cost of the terminal building and aircraft service area is strongly influenced by the number of gate positions. A gate is a parking space for an aircraft, incorporating the facilities needed to service a single aircraft at the terminal building. It includes facilities for the transfer of passengers and baggage, cabin cleaning and catering, air conditioning, crew changeover, aircraft refueling, maintenance inspection, etc. If airport runway capacity is adequate, the constraint on the capacity of the airport is likely to be the number of gate positions available. Because gate capacity can be provided in small increments, the ability to determine the optimum time for the provision of an extra gate position is of great importance from a capital programming viewpoint.

McKenzie, AJ Huggett, JWE (Department of Transport, Australia) Ogden, KW (Monash University, Australia) *ASCE Journal of Transportation Engineering* Vol. 100 No. 1E4, Nov. 1974, pp 855-872

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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08 155514

#### OPERATIONAL CONSIDERATIONS IN THE DESIGN OF AIRPORTS

This paper discusses porous friction runway overlay as an alternative to runway grooving (for solution of the wet runway braking problem), airport surface traffic control system (STRACS), taxiway guidance lighting, taxi guidance signs, operational considerations and taxiway markers. A porous overlay was constructed at the Naval Air Station, Dallas where jet aircraft with tire pressures exceeding 200 lb/sq in operate regularly. The STRACS developed for Kennedy International Airport is described. Experience with taxiway centerline lighting is recounted. Considerable experimentation led to the development of a color coding concept for 3 types of signs: red, yellow and green background for mandatory, information, and convenience signs respectively. A taxiway marker (which meets all requirements) is described which consists of a blue, cylindrical tube, 2 ft x 2-3/4 in. in diameter inserted into the ground in the same pattern as that used for taxiway edge lights.

Achitoff, L (Port Authority of New York and New Jersey) *Airports International* No. 34, Jan. 1974, p 29

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155516

#### A NEW APPROACH AND LANDING SYSTEM: HELP FOR OUR TROUBLED TERMINAL AREAS

Recent advances in technology, and growing airport congestion, delays, and threat of mid-air collision, are setting the scene for a new terminal area air traffic control system. A key element in the new air traffic control system will be the scanning beam microwave Instrument Landing System, now under-going final system specification by Special Committee 117 of the Radio Technical Commission for Aeronautics. This new landing sensor, coupled with other state-of-the-art technology, modification of certain FAA regulations and procedures, and wise system design and engineering, can result in a new approach and landing system capable of: (1) increasing airport capacity, (2) increasing terminal area safety, (3) providing the basis for all-weather operation, and (4) simultaneously providing a reduction in airport neighborhood noise. This paper describes the growing problem in the terminal areas, and the technology which can solve the problem. It lists technical objective to be achieved by the new technology and proposes an air traffic control system concept and aircraft guidance scheme which can result in realization of the objectives. The paper concludes with a recommendation for a vigorous program to develop the new system.

Cherry, GW De Wolf, B Mackinnon, D  
Massachusetts Institute of Technology R-654, 1970, 16 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155517

#### INCREASING AIRPORT CAPACITY AND TERMINAL AREA SAFETY BY MEANS OF THE SCANNING BEAM INSTRUMENT LANDING SYSTEM

The current terminal air traffic control system must be upgraded to take advantage of new technological developments if airport capacity is to be expanded to meet demand. A simple model of runway landing capacity shows that the rates of capacity increase resulting from a reduction in the dispersion of arrival times at the runway threshold increases as the dispersion decreases, and that significant capacity increases can be obtained through the use of more accurate guidance. For this purpose, a slot-coincidence motion scheme for use in the high-capacity airport is presented which takes advantage of the accuracy of the new scanning beam ILS and on-board control systems. Trajectory design concepts and feed-forward guidance laws are developed and some simulation results are presented using a detailed model of the CV-880.

Cherry, GW De Wolf, B MacKinnon, D  
Massachusetts Institute of Technology E-2516, 1970, 18 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155532

#### INDICES FOR EVALUATING ATC TERMINAL AREA OPERATIONS AND THEIR ROLE IN COST/BENEFIT ANALYSES

The feasibility was studied of devising indices which could be used to assess the performance of an ATC terminal area. These indices are to be based on easily available data and designed to reflect system degradation, safety and system workload. This report presents a prototype analysis of data relating to the Boston, Massachusetts terminal area. The authors conducted that indices can be devised and their relationships established with environmental variables such as congestion, weather, equipment outages, etc. These relationships show which of these variables are the most significant and their relative magnitudes in influencing performance. The report also discusses the role of simulation in terminal area improvement evaluation, an unambiguous definition of operational delay is proposed. Finally, a cost/benefit paradigm is presented for the Boston Terminal Area.

Boulogiane, IA Everett, JL Koopman, BO  
Little (Arthur D), Incorporated Mar. 1973, 200 pp

ACKNOWLEDGMENT: Port Authority of New York and New Jersey

08 155536

#### STUDIES IN SHORT HAUL AIR TRANSPORTATION IN THE CALIFORNIA CORRIDOR: EFFECTS OF DESIGN RUNWAY LENGTH; COMMUNITY ACCEPTANCE; IMPACT OF RETURN ON INVESTMENT AND FUEL COST INCREASES

The primary purpose of this study is to analyze the impact of design runway length on the economics and traffic demand of a 1985 short haul air transportation system. The second major objective is to study community acceptance of new commercial airports for short haul service. The California corridor, or more specifically the route from the San Francisco Bay Area to the Greater Los Angeles area, is chosen as the study location. The system studied are a 2000-ft runway system, usually designed as a STOL system and a 3000-ft runway system, designated as a reduced runway length or RTOL system. The STOL/RTOL differentiation is a rather arbitrary convenience only since neither has a clear universally accepted definition and, in this case, both use similar propulsive lift concepts. The two systems are alternative short haul commuter systems, separate as much as possible from the remainder of the air transport system but using existing major terminals if no other reasonable choice exists. Terminals are chosen to cover the demand area as uniformly as possible. The 2000-ft system utilizes a Central Business District (CBD) STOLport. It is assumed that a CBD STOLport could not accommodate a 3000-ft runway. This assumption is the major impetus for studying the 2000-ft case since all other STOLports or RTOLports are placed on existing airport sites with runways greater than 2000 feet in length. The major question is whether the access advantages of a CBD STOLport outweighs the higher cost of a 2000-ft runway aircraft. In truth, the



likelihood of any CBD terminals, capable of handling 100 to 150 passenger aircraft, ever existing is small. The likelihood of enough of them existing to justify the expensive shorter field length aircraft is close to zero. Nevertheless, a 2000-ft CBD was assumed at both ends of the route studied here to evaluate the relative worth of 2000-ft and 3000-ft runway length aircraft assuming that the former has the advantage of a CBD STOLport. Since both systems are to a large extent separate from the basic air transport system, no significant traffic delays are anticipated. When the major terminals are used, a longer processing time, from arrival at the parking lot to select reasonable and consistent values. Since the main purpose is a comparison, consistency is paramount. Several interesting secondary results evolved during the study, namely the effect on demand, fares and total perceived travel costs of rate of return on investment (ROI) and fuel cost increases.

Shevell, RS  
Stanford University NASA CR-114634, July 1973

ACKNOWLEDGMENT: Port Authority of New York and New Jersey

08 155543

#### GROUND TIME COSTS MONEY: HANDLING PROBLEMS AT AIRPORTS

Examples are quoted of airline efforts to evaluate the overall economic pros and cons of various handling techniques. The long-range planning undertaken by Lufthansa provides a frame of reference within which decisions can be made and general policies established to cover continuing situations. The problem of aircraft positioning is discussed with particular regard to wide-body jets. Aircraft improvements are considered possible in 3 main areas: wide-body jets, aircraft fuelling, and cabin cleaning and galley replenishment. Palletization and containerization of freight and baggage, containerization of transfer fuel, and exchangeable cabin modules to obviolate cabin cleaning are discussed as possibilities. The mobile lounge is cited as an example of concepts which have generated sharp differences of opinion comments are made on concepts which may be considered for future implementation. These include the provision of service outlets at each aircraft parking point with underground fuel distribution systems, and the use of tow tractors to replace taxiing.

Hohle, K *Interavia* Vol. 31 No. 12, Dec. 1976, pp 1148-50

ACKNOWLEDGMENT: Port Authority of New York and New Jersey

08 155547

#### THE AIRPORT: ARCHITECTURE-URBAN INTEGRATION-ECOLOGICAL PROBLEMS

Questions regarding the development and the history of the airport are discussed along with airport planning criteria, airport types, runway design, meteorological problems in airport selection, ecological considerations, accessibility problems, and aspects of noise and air pollution. Subjects related to the airport interface are considered, giving attention to terminal design, the development of terminal configurations, passenger handling, and various terminal sectional areas. Aspects of airport design related to the conduction of air traffic operations are explored, taking into account the use of the airspace, holding patterns, approach zones, terminal air traffic control, and special problems connected with the employment of new types of aircraft such as the Concorde, V/STOL, and high-capacity conventional aircraft. Descriptions of a number of specific airports are given to illustrate the general concepts underlying the design and the operations of an airport.

Balkenship, EG (Trans World Airlines)  
Praeger Publishers, Incorporated 1974, 159 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155558

#### INCREASING RUNWAY CAPACITY

Studies have indicated that one of the following major factors may finally limit the capacity of an airport: 1) The ability of the air traffic control (ATC) system to handle aircraft arrivals and departures. 2) The capacity of the runways for aircraft arrivals and departures. 3) The handling and movement of aircraft on the airport surface. 4) The flow of people through the terminal interchange. 5) The ground transportation access and egress from the airport. 6) The noise and pollution problems in the area. Within these limits, it appears that increasing the capacity of existing airports by changes in runway and taxiway configurations, and the associated air traffic control system, offers promising and early solutions to many of the problems on capacity restrictions during the next 10-year period.

Astholz, PT (Federal Aviation Administration) *Esso Air World* Vol. 24 No. 2, 1971, pp 35-39

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155559

#### RESTRUCTURE THE ATC SYSTEM

This article points out the need to balance the human, electronic, and safety responsibilities between the controller and the pilot in a restructuring of the air-traffic-control system. It is noted that the pilot does not have a satisfactory means for checking the controllers actions. The need is indicated for a means whereby a pilot could see an aircraft in his proximity.

Litchford, GB (Litchford Electronics) *Astronautics and Aeronautics* Vol. 14 No. 2, Feb. 1976, pp 32-37

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

08 155567

#### COMING-TANDEM RUNWAYS?

Two runways on a common centerline—with plenty of spacing between—could up capacity of long, narrow airport sites.

Vickers, K (Buckley (James C) Incorporated) *Airport World* Vol. 7 No. 3, Mar. 1974, pp 28-30

ACKNOWLEDGMENT: Federal Aviation Administration Library

08 155573

#### AIRPORT CATERING FACILITIES ARE HIGH REQUIREMENTS

Passengers and airport visitors make very different demands on the caterer, who wants to offer his guests oases of quiet and comfort. He can only do this, however, if the airport makes it possible for him. The requirements of this "realm of Lucullus" must therefore be made known early to both planners and architects. The writer has interviewed leading men from the company, Steigenberger Hotelgesellschaft, on the subject and assembled a long list of requirements and suggestions in the following article. They arise from the experience accumulated by Germany's biggest hotel company and its subsidiary, Steigenberger consulting, which also runs and helped to plan all the restaurants but one at Frankfurt airport.

Colbatzky, M *Airport Forum* Vol. 4 No. 1, Mar. 1974, pp 84-94

ACKNOWLEDGMENT: Federal Aviation Administration Library

08 155577

#### DFW GETS IT ALL TOGETHER FOR DEDICATION THIS MONTH

This article comments on the planning of the Dallas/Fort Worth facility and the related land use planning factors. The construction innovations implemented at DFW are briefly discussed, the special features of the central utility plant are described, and the ground transportation and planning aspects are reviewed. Comments are also made on the economic impact of the airport, and the financing of the construction. The airport which was 3 runways and 2 additional preplanned primary runways, is designed to accommodate the wing spread and fuselage lengths for any foreseeable future aircraft. Among the construction innovations developed here was the construction of runways and taxiways with a new mechanized system for installing expansion and contraction bars. Terminal facilities are based on a circular design. Steam and chilled water are generated from a central utility plant located in the center of the terminal complex and midway through the spine tunnel. It is expected that the airport will contribute almost \$267 million in direct purchases of goods and services.

*Airport Services Management* Vol. 14 No. 9, Sept. 1973, pp 16-21

ACKNOWLEDGMENT: Federal Aviation Administration Library

08 155595

#### AIRPORT SURFACE TRAFFIC CONTROL TAGS PLANNING ALTERNATIVES AND COST/BENEFIT ANALYSIS

The findings of a cost/benefit analysis of the deployment of a new airport ground surveillance system TAGS (Tower Automated Ground Surveillance) are presented. TAGS will provide a plain view display of aircraft on the airports taxiways and runways like ground surveillance radar (ASE); but unlike ASDE, TAGS will perform in heavy precipitation and automatically



acquire and display aircraft flight identity. The findings indicate that a TAGS deployment of between four and nine systems is cost/beneficial. The development plan, system costs, analysis approach and sensitivity analysis supporting the findings are provided.

Rempfer, PS (Transportation Systems Center)  
Federal Aviation Administration FAA-RD-77-9, 1977, 52 pp

ACKNOWLEDGMENT: Federal Aviation Administration Library

08 155596

#### AIRPORT SURFACE TRAFFIC CONTROL VISUAL GROUND AIDS ENGINEERING AND DEVELOPMENT PLAN

The plan described in this document supports the overall program at the Transportation Systems Center to define, design, develop, and evaluate systems that meet the requirements of airport surface traffic control. This plan is part of documentation supporting one aspect of the program, visual ground aids development. There are twenty-four concerns with the present visual ground aids. The concerns deal with the ability of the present system and its components to support taxiing operations in the lower visibility environment found during Category III conditions. This report describes an engineering and development plan which will identify solutions for the concerns, create the specifications for improved visual ground aids and lay the ground work for application in future Category III operations. The management of the development process leading to major improvements in the present system is described. The plan includes a schedule, budget, milestones and evaluation criteria.

Mackenzie, FD (Transportation Systems Center)  
Federal Aviation Administration FAA-RD-77-16, 1977, 68 pp

ACKNOWLEDGMENT: Federal Aviation Administration Library

08 155599

#### PARALLEL RUNWAYS TO BEAT AIRPORT CONGESTION

Parallel runways make it possible to increase the airport's capacity and reduce delays to a greater extent than divergent or intersecting runways. The various possible configurations for parallel runways are tabulated together with data relating to their respective capacity compared with those of intersecting or divergent runways. A minimum spacing of 5,000 ft. between runways is essential. This spacing makes possible simultaneous ILS approaches, thus giving the parallel runway system true double capacity.

ITA Bulletin Mar. 1970, pp 241-244

ACKNOWLEDGMENT: Federal Aviation Administration Library

08 155606

#### THE IMPROVEMENT OF WET-RUNWAY OPERATION

Three different types of runway hydroplaning (viscous hydroplaning, reverted rubber hydroplaning, and dynamic hydroplaning) are described, and means of reducing such problems are suggested. It has been found that transverse grooving tends to reduce the amount of time in which any type of hydroplaning can occur. Comparative tests have shown that the grooving tends to produce more uniform friction than ungrooved surfaces. The greater the cross-sectional area of the groove, the more water it can hold before overflowing. Grooves which are too wide, however, will trap debris. Grooves 1/4 inch deep, spaced one inch between centers give maximum traction. The overall effect of runway grooving is to permit a wet runway to approach the braking capability of a dry runway. The cost of grooving existing runways is discussed.

Vicker, TK *Controller* Vol. 11 No. 1-4, Dec. 1972, pp 69-73

ACKNOWLEDGMENT: Federal Aviation Administration

08 155621

#### EFFECT OF MULTIPLE PATH APPROACH PROCEDURES ON RUNWAY LANDING CAPACITY

The objective of this research is to find out whether the introduction of MLS and consequently multiple approach paths can bring an increase in runway landing capacity. A model is developed which is capable of computing the expected ultimate landing runway capacity, under ILS and MLS conditions, when aircraft population characteristics and Air Traffic Control Separation rules are given. This model can be applied in situations when only a horizontal separation between aircraft approaching a runway is allowed, as

well as when both vertical and horizontal separations are possible. Results suggest that an increase in runway landing capacity caused by introducing the MLS-described multiple approach paths, is to be expected only when an aircraft population consists of aircraft with significantly differing approach velocities and particularly in situations when a vertical separation can be applied.

Tosic, V Horonjeff, R (California University, Berkeley) *Transportation Research* Vol. 10 No. 5, Oct. 1976, pp 319-329, 6 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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08 155627

#### GENERAL AVIATION'S URBAN AIRPORT CAPACITY PROBLEM

The characteristics of peak hour traffic are discussed, and a concept that might substantially increase the potential service capability of existing major urban general aviation airports is described. Peak hour traffic demand may be modified by allocating airport use by either week or time of day. If some of the touch and go operations which account for a high proportion of peak hour traffic could be diverted to other facilities during these hours, congestion would be reduced, and make available sizeable amounts of capacity for itinerant operations. The results of diverting peak hour training traffic to outlying airports is discussed with special reference to Buchanan-Field, Concord, California.

Gillfillan, WE *ASCE Journal of Transportation Engineering* Vol. 96 No. E1, Feb. 1970, pp 79-85, 3 Fig., 4 Tab., 1 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

08 155632

#### A MODEL OF LONG DELAYS AT BUSY AIRPORTS

In an effort to provide a tool to assist in evaluating the benefits (in terms of reduced delay) of any policy to limit traffic, a model is presented of long delays at busy airports, and an improved method is outlined of estimating delay patterns. The model which is fitted for arrivals at Kennedy International Airport, is a simple deterministic queueing model. The arrival rate is taken to be the rate at which present arrivals or departures would land or take off if there were unlimited capacity to accommodate them. The acceptance rate is the maximum number of operations that an airport can accept during a period of time. It is a maximum technological capacity of the airport and the surrounding airspace and is higher than the capacity defined by 4-minute average delay. Traffic and delay estimates for Kennedy are provided which make it possible to calibrate a computerized version of the model. The estimates are disaggregated by weather and season. Some results of reduction in delay to be expected from specified reductions in traffic are summarized.

Carlin, A Park, RE (Rand Corporation) *Journal of Transport Economics and Policy* Vol. 4 No. 1, Jan. 1970, pp 37-52

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155633

#### AIRPORTS THAT BRING THE PLANES TO THE PEOPLE

Typical elements of new trends in airport design are noted, and airports such as Houston Intercontinental Airport, Tampa International Airport, and the Kansas Mid-Continental International Airport are described as examples. Some of the new designs include: decentralized terminals in a satellite or a circular formation that allows planes to belly up to boarding stations; people moving systems like the one in Houston where 4 battery-powered subway trains that carry 21 passengers each, seven to a car, and run at 2 minute intervals at rush hours; and long-term parking lots for private autos close to or atop terminals.

*Business Week* No. 2111, Feb. 1970, pp 98-100

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155639

#### NORTH LONDON DILEMMA

In this article, the author examines the conflicting demands on the airspace in the London terminal control area north of London.

Field, H *Flight International* Vol. 97 No. 3177, Jan. 1970, pp 145-147

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155643

#### MODELING FOR AIR TRAFFIC CONTROL SYSTEMS

In this paper several classes of models of Air Traffic Control-related systems that have been presented over the years are reviewed. These models cover the complete spectrum of ATC activities: surface traffic movement, runway utilization, terminal areas; and enroute traffic. Outstanding work in each area is summarized and criticized. The techniques employed range from the purely analytical to real and fast time simulations. Topics for possible future work are also identified on the basis of the present review. Finally, an extensive annotated bibliography is included.

Odoni, AR

Massachusetts Institute of Technology FTL Tech Memo 71-4, No Date, 39 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

ORDER FROM: Massachusetts Institute of Technology, Flight Transportation Laboratory, Cambridge, Massachusetts, 02139

08 155645

#### AREN'T AIRPORT PLANNERS FORGETTING ABOUT TRANSFERS?

This study presents an analysis of the effectiveness of various passenger terminal designs for airports in satisfying different kinds of passenger loads and mixes of traffic. Special attention is given, throughout the study, to three types of design, gate-arrival, pier-finger and transporter. These designs are compared in terms of passenger walking distances, in-terminal time and total costs, subject to loads involving difference in the degree of peaks of traffic and the percentage of transfers. The study indicates a method, based on data publicly available, for computing total, on-line and off-line transfer rates at US airport hubs and Canada airports. Some figures of transfer rates obtained by means of this method are also presented. The results of the comparison between these three types of terminals indicate that the relative effectiveness of the different designs depend upon the peakness of traffic and upon the percentages of transfer passengers the terminals are serving.

Rusconi-Clerici, I

Massachusetts Institute of Technology MS Thesis Jan. 1976, 143 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155648

#### ATC AUTOMATION WITH MUNICOMPUTERS

This article discusses the Raytheon Direct Access Radar Channel (RAY-DARC) System, demonstrated at the 1975 ATCA Annual Meeting, and a production system.

Busch, RE Schwerdt, KR (Raytheon Company) *Journal of Air Traffic Control* Vol. 18 No. 4, Oct. 1976, pp 20-23

ACKNOWLEDGMENT: Federal Aviation Administration Library

08 155649

#### THE AIRPORT NETWORK FLOW SIMULATOR

A GFSS Model was constructed to simulate the propagation of delays through a nine-airport system. The model is largely based on, and calibrated to, scheduled air carrier itineraries through the system. It calculates statistics and costs for landing, takeoff, and gate arrival delays.

Gordon, S

Transportation Systems Center FAA-ASP-75-6, May 1976, 92 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155654

#### AIRPORT CAPACITY, VOLUME 1-NATIONAL SUMMARY

This study which analyzes the impact of FAA programs on airport capacity over the next ten years, is reported in two volumes: The first volume forms a summary of the findings of the study; the second volume presents the detailed examinations of each of the selected airports. Eight major airports (Atlanta, Chicago O'Hare, Denver, Los Angeles, Miami, New York Kennedy, Philadelphia, and San Francisco) were examined in detail. VFR capacities will increase about 25% over today, and IFR about 50%. A major requirement will be the metering and spacing and wake vortex avoidance

systems programs. With these systems in place, IFR capacity will rise from its present level of 75% of VFR capacity to about 90%, thus increasing the ability to maintain sustained all-weather operations. If these improvements are achieved, no airport surveyed will in the long term (1979-1982)) experience peak hour VFR saturation, and only one airport is projected to experience peak hour IFR saturation. The airside capacity of these airports can be extended, within the present E&D and F&E framework, to meet projected demand for the mid to late 1980's. Under current and proposed plans, most of the surveyed airports will have exceeded their landside capacity before these air traffic levels are reached. The problems are primarily physical access/egress/parking limitations. These will require new access concepts and possibly new major airports which should be planned for now.

Federal Aviation Administration FAA-EM-74-5, Jan. 1974, 98 pp

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08 155658

#### IMPORT TERMINALS REFERENCE MANUAL, SIXTH EDITION

This manual which is intended to assist Airport and Government Authorities, Architects, Designers, Consultants and Airlines in planning the international airport terminal complex, presents recommendations which apply not only to purely domestic airport terminals. The terminal complex is assumed to include both passenger and cargo terminal buildings, as well as adjacent airside and landside areas with their associated facilities. The various facets of airport terminal planning are considered in relation to the present and future generation of jet aircraft, and with particular emphasis on airlines' functional requirements. As the ideal terminal adaptable to all airports has not yet been designed, it is essential in applying the broad guidelines in the manual to local situations, to establish close and constant consultation from the earliest planning stage between the Authority, consultants and the airlines serving the location. This consultation should include the cost aspects of all projected developments.

International Air Transport Association Dec. 1976

ACKNOWLEDGMENT: Air Transport Association of America Library

08 155665

#### AERODROMES

General data on aerodromes are presented as well as the reference code for aerodrome characteristics. The physical characteristics (runways, strips, clearways, stopways, taxiways, and holding bays) of aerodromes are detailed, and obstruction, restriction, removal and marking (surfaces and areas, obstruction marking, etc.) are reviewed. Visual ground aids (signalling devices, emergency lighting, lighting, signing and marking aids), aerodrome equipment (secondary power supply, monitoring, fencing, etc.), services (rescue and fire-fighting, bird hazard reduction, maintenance services) are also covered.

International Civil Aviation Organization Sept. 1971

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155666

#### AERODROME MANUAL

This manual which provides information regarding the design and construction of aerodromes and the equipment thereon, is designed to encourage the uniform application of specifications and to provide guidance to Contracting States. The manual covers: general aircraft characteristics; aerodrome physical characteristics; obstruction restriction, removal and marking (surfaces, shielding, hazards) visual ground aids; equipment, procedures and services (rescue, fire fighting, runway surface conditions, bird hazard etc.); and heliports; water aerodromes.

International Civil Aviation Organization 1971

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155669

#### CONGESTION TOLLS FOR COMMERCIAL AIRPORTS

This paper discusses the role of congestion tolls in increasing the efficiency of use of commercial airports, in terms of a simple model of air transportation. In contrast to previous discussions, users and producers of transportation service (passengers and airlines) are explicitly distinguished.



In the first version of the model, ticket prices are assumed-unrealistically-to be flexible and competitively determined; then perfect optimality is attainable by imposing an appropriate toll either on airlines or on passengers. In the more realistic second version of the model, ticket price is based above the competitive level. In the absence of a toll, there are two inefficiencies: the level of transportation is non-optimal, and it is produced inefficiently, using partially loaded airplanes. An appropriate toll on airlines can do much to correct both of these inefficiencies, and is always superior to the best toll or passengers.

Park, RE (Rand Corporation) *Econometrica* Vol. 39 No. 5, Sept. 1971, pp 683-694

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155681

#### PLANNING FOR FUTURE AIR TRANSPORTATION FACILITY NEEDS: A CASE STUDY

In recent years congestion has been mounting at many of the large and medium hub airports in the nation. Solutions offered for eliminating congestion and thus delay in the landing and takeoff of aircraft are fourfold. The first, and probably the most popular with regional planners, is that more airports should be built to accommodate air traffic at peak activity periods. A second suggestion is to improve air traffic control procedure, thereby increasing the utilization of existing air space. A third, flat rationing by the Federal Aviation Administration involves setting up criteria by the administration to decide which planes will be allowed to utilize the airport facilities at peak traffic periods. The last proposal is to allow cooperation among competing airlines to decrease the number of competing flights during peak periods. With the heightened awareness of the energy shortage this alternative is being vigorously pursued by the major airlines with the comment of the trial Aeronautics Board.

Cerwonka, R (Providence College) *Transportation Journal* Vol. 14 No. 4, June 1975, pp 40-47

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155685

#### GATE POSITION REQUIREMENTS AT METROPOLITAN AIRPORTS

The number of gate positions required at an airport, or the number of flights that can be accommodated at a given number of gate positions, depends on how efficiently each gate position is used. The airlines schedule and the airport's operating policies influence the efficient use of the gate positions. A simple stochastic model describing the behavior of flights relative to their schedule was developed based on empirical information. The model was then used to study the influence of a common scheduling practice of bank operation on the requirements for gate positions. It was found that a completely uniform schedule generates the minimum requirement. A procedure is measured to estimate the number of gate positions required at an airport.

Stewart, GN (Toronto University, Canada) *Transportation Science* Vol. 8 No. 2, May 1974, pp 169-189, 7 Fig., 2 Tab., 7 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

08 155700

#### TIME DEPENDENT ESTIMATES OF DELAYS AND DELAY COSTS AT MAJOR AIRPORTS

Two queueing models appropriate for estimating time dependent delays and delay costs at major airports are reviewed. The models use the demand and capacity profiles at any given airport as well as the number of runways there to compute bounds on queueing statistics. The bounds are obtained through the iterative solution of systems of equations describing the two models. This computational procedure is highly efficient and inexpensive. The assumptions and limitations of the models are discussed. Common characteristics and properties of delay profiles at major airports are illustrated through a detailed example. Potential applications to the exploration of the effect of air traffic control innovations on congestion and to the estimation of marginal delay costs are also described.

Massachusetts Institute of Technology FTC Report 75-4, Jan. 1975, 35 pp

92

ACKNOWLEDGMENT: Flight Transportation Laboratory, MIT  
ORDER FROM: Massachusetts Institute of Technology, Flight Transportation Laboratory, Cambridge, Massachusetts, 02139

08 155704

#### HYDRANT FUELLING FOR AIRCRAFT

London's Heathrow, one of the World's busiest airports, has a hydrant fuelling system that has been built up step by step since 1969 to meet steadily mounting requirements. Following a description of this system, which is second to none in the world, the author turns his attention to general questions concerning the design and installation of fuel distribution systems of this kind. He also touches on security questions and describes some of the experience so far accumulated. Finally, in a brief glance ahead, he suggests developments that should not be ignored by airport planners.

Benstead, R (Petrofina Limited) *Airport Forum* Vol. 5 No. 5, Oct. 1975, pp 45-47, 5 Fig., 3 Phot.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155705

#### IMPACT OF WIDE-BODY JETS ON LARGO FACILITIES

Can new airport buildings and terminal areas be designed for equally effective handling of passengers and freight? This is a valid question at the present time, now that the wide-body jet age is with us. Not only does the wide-body jet offer more in the way of comfort and appeal to the passenger, it also offers a decided improvement in "cargo appeal" as well. This article reviews the impact of the wide-body types on the requirements for airport cargo facilities. In addition, it presents some relevant features of a new airport concept tailored to meet wide-body aircraft needs that could be applied at the new airport envisaged for Mexico City.

Stoessd, RF *Airport Forum* Vol. 5 No. 6, Dec. 1975, pp 28-35, 4 Fig.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155710

#### SLOPED RUNWAY DESIGN FOR AIRPORTS

This article considers a new aspect in airport runway design with the introduction of a slope factor for the runway, a feature which will allow aircraft to attain a quicker takeoff as well as to land safely over a much shorter runway length. Savings in energy-fuel for both takeoff and landing are described. Reduction of aircraft noise, increase in aerodynamic stability by quicker lift-off, lower requirement for long runways and, correspondingly, less waste of land for runway space, increased operational range and payload of aircraft using such sloped runways, and higher use frequency of the runways by aircraft are discussed.

Murray, JJ *High Speed Ground Transportation Journal* Vol. 9 No. 3, Sept. 1975, pp 107-111, 8 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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08 155711

#### RUNWAY LENGTH OPTIMIZATION AND AIRPORT PRICING

The downward trend in aircraft costs and the upward trend in airport costs with increasing runway length suggest that analysis could predict the optimum characteristics for both. Curves (or functions) for both airport and aircraft costs would be constructed in terms of runway length. The optimum runway length is that at which the sum of the curves shows a minimum cost. If the minimum cost is not sharply defined, but rather exhibits a wide flat valley over a range of runway lengths, then it is a matter of indifference to the operator what runway length is chosen within this range. The curves are derived as follows. A curve of aircraft operating costs versus runway length is computed by calculating costs of hypothetical fleets at several discrete runway lengths. By hypothetical fleet is meant that, at each runway length, the costs of the aircraft actually based at the airport under study were modified to what they would have been had each airplane been designed to operate from exactly that length of runway. Each point on the cost curve represents the sum of the costs of all aircraft in the hypothetical fleet assuming each flew the same of hours during the period in question as did its real-life counterpart. The total cost of production is found as a function of runway length by summing together the curve of aircraft operating costs and the curve of runway costs. The lowest point on the summation defines what might be called the socially optimal (externalities excepted) runway



length for that airport with the activity mix it experienced and the land value postulated. It is noted that pricing is the obvious element in the policy domain where action could be taken to provide consumers with an incentive to adopt less runway-requiring aircraft.

Piper, RR *Traffic Quarterly* Vol. 27 No. 3, July 1973, pp 399-417, 6 Fig.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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08 155713

## LAKE ERIE AIRPORT STUDY

Completed investigations include weather studies, Lake bottom soils surveys, and environmental surveys of Lake waters and sediments. Weather, noise levels, air and water quality impacts, airspace/air traffic control considerations, obstruction clearances, effects on lake currents and lake navigation routes, and aesthetic considerations have been evaluated. The feasibility of dividing airport functions between the offshore site and onshore facilities has been studied, facility requirement developed, and airport layout schematics formulated. Potential construction configurations have been analyzed. Construction materials availability and transport methods are being investigated, alternative construction methods are being studied, and cost-effectiveness evaluations have been initiated. Environmental impacts and legal questions are under intensive study. Future work includes function/selection access planning, cost-benefit analysis, financial planning, further environmental impacts, and final feasibility analysis.

Crawford, HR (Howard, Needles, Tammen and Bergendoff) *ASCE Journal of Transportation Engineering* Vol. 103 No. TE2, Mar. 1977, pp 321-335, 9 Fig., 14 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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08 155714

## OPTIMUM LIGHTING FOR AIRPORT APRONS

Optimally lit airport aprons are a high-ranking safety factor in all respects. They ensure that operations on the ramp can be continued rationally and without delays even after dark. The authors of this article discuss the general aspects that must be taken into consideration in designing apron lighting systems. In the process it becomes clear that much more thought should be given to this subject by scientists, associations and the authorities. The article concludes by presenting an optimum lighting design that has been prepared with the aid of a computer.

Zieseniss, CH (Philips GmbH, Hamburg) Holthus, DE (Hamburg Airport Company) *Airport Forum* Vol. 6 No. 3, June 1976, pp 31-35, 2 Fig., 3 Phot.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155717

## THE AIR CITY

The basic physical constraints of an Air City are outlined, the amount of land required for air operations and for recreational facilities are discussed, ground transport characteristics are reviewed, and comments are made on social and political aspects. The air terminal facilities of such a city must be able to handle conventional takeoff and landing, short takeoff and landing, vertical takeoff and landing and general aviation aircraft on a noninterfering basis. The constraints imposed upon the location and configuration of this air city are mentioned. Typical configurations are illustrated, and components of various related subsystems (hotels, trade fair and recreation areas) are discussed. Ground transport demands will require peripheral parking lots capable of handling up to half a million vehicles. Baggage handling and intra-airport transport systems are briefly discussed and comments are made on the effect of system capacity on the quality of service.

Hall, EN (United Aircraft Corporation) *Traffic Quarterly* Jan. 1972, pp 15-32, 4 Fig.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

08 155750

## UNIQUE AIR CURTAIN INSTALLATION SOLVES DIFFICULT AIRPORT PROBLEM

The article considers the design of an air curtain in operation at LaGuardia Airport since 1971, the purpose of which is to keep jet exhaust fumes from migrating, due to mass diffusion and inadequate ventilation system exhaust, to the passenger luggage pick-up area. The design consists of a negative pressure outdoor vestibule, coupled with a slightly less negative exhaust system for handling the air immediately adjacent to the door opening. The system has an axial-flow constant speed exhaust fan which discharges the unwanted air toward jet aircraft away from the building. A smaller constant speed fan handles interior air.

Johnston, W (Hannaham and Johnston) *Building Systems Design* Vol. 73 Apr. 1976, pp 25-29

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

76A-40425

08 155752

## INSTALLATION OF RUNWAY LIGHTING SYSTEM IN ASPHALT POURING

The resurfacing and relighting of a runway, while keeping it in operation, at Lovell Field Chattanooga, Tennessee are described. Attention is given to the paving operation, the installation of centerline lights, the establishment of safety procedures, and inspection.

Proceedings of the 4th Annual Intersociety Conference on Transportation, Los Angeles, California.

Sutton, PJ (Hensley-Schmidt, Incorporated)  
American Society of Mechanical Engineers Proceeding July 1976, 3 pp

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A77-29464

08 155753

## OPTIMIZING AIRPORT RUNWAY IMPROVEMENT PROGRAM-A DYNAMIC PROGRAMMING APPROACH

In order to reduce the air traffic delay in the terminal area, an immediate remedy is to increase airport capacity by an expansion of the existing runway system. The runway expansion program is often limited by budgetary constraints; the expensive facilities for a long-term improvement cannot be built at once. When a runway improvement strategy is being considered for a longer planning horizon, the investment decision depends upon the correlation of its composite periods. The problem, therefore, is to determine how time factor and investment decision interact to yield an optimal improvement scheme that meets demand at a minimum cost. With this objective in mind, a dynamic programming methodology is employed to determine the optimal planning scheme. Also, an example runway improvement problem is listed to illustrate how a dynamic programming model is practical in actual application.

From Modeling and Simulation, Volume 6. Proceedings of the 6th Annual Conference, Pittsburgh, 24-25 April 1975.

Yu, JC (Utah University) Gibson, D (Federal Highway Administration)  
Instrument Society of America Proceeding 1975, pp 693-697, 16 Ref.

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-23156

08 155754

## SNOW AND ICE CLEARING METHODS-NEW TECHNIQUES AND ADVANCED THINKING AT MAJOR AIRPORTS

No Abstract.

From the Challenging Future. Proceedings of the 5th World Airports Conference, Brighton, England, 5-7 May 1976.

Huson, RW (SMI Industries, Limited)  
Institution of Civil Engineers Proceeding 1976, 6 pp

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-46545

08 155764

#### MARKING SYSTEMS TO GUIDE AIRPORT TRAFFIC

The importance and uses of airfield traffic and guidance markings and practical requirements for markings are reviewed. Chlorinated rubber-base paint (e.g. alloprenne) markings are judged satisfactory on many counts, including: durability in the face of weathering and exposure of de-icing chemicals, easy and rapid application by a variety of techniques (brush, airless spray, air assisted spray), rapid drying, applicability under extreme climatic conditions including tropical and subarctic condition, clarity and distinct coloration, and no requirement for pre-mixing. Speed of application is usual for airfield safety (both for marking new and aircraft.) Old markings do not have to be removed for adhesion. Reflectorization of the markings with glass beads to improve night visibility is no problem. Experience in the USA and at Paris and London with chlorinated rubber-base paint markings is reviewed.

Ferguson, WD (Imperial Metal Industries, Limited) *Airports International* No. 53, Feb. 1976, pp 29-30

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155809

#### A SUMMARY OF AIRPORT SYSTEM REQUIREMENTS

The requirements of the electrical, electronic, and mechanical systems that are supporting the operation of an airport are examined. Some of the systems necessary in modern electromechanical installations are outlined. The discussion covers power and lighting systems, airfield lighting, aircraft parking aids, flight information systems, public address system, automatic baggage handling systems, fire alarm and fire fighting systems, telephone system, electronic clock system, lifts and escalators, and air conditioning.

Chrysandreas, A *Aircraft Engineering* Vol. 47 No. 8, Aug. 1975, pp 20-23

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

08 155817

#### FUTURE ATC TECHNOLOGY IMPROVEMENTS AND THE IMPACT ON AIRPORT CAPACITY

The United States is presently in its third generation of air traffic control systems and technology. This third generation system is the first nationwide application of modern computer based technology to the management of traffic in the national airspace system. Twenty NAS Stage A enroute installations are now in place at the domestic air route traffic control centers. In addition, 61 automated radar terminal systems are now installed and operational in the major terminal areas. Linkages between these enroute and terminal facilities are presently being established and verified. Upon completion of the installation and testing the U.S.A. will have operational a large scale, semi-automated capability to provide highly improved ATC services for domestic medium, high altitude, and terminal airspace.

From AGARD, Plans and Developments for Air Traffic Systems.

Harris, RM (Mitre Corporation)

Advisory Group for Aeronautical Res & Dev-NATO Feb. 1976, 14 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

08 155831

#### NEW METHODS OF DETERMINING AIRPORT CAPACITY AND DELAY

The paper describes models to estimate airport capacity and delays and discusses the relevance of the models to airport planning. An analytical approach was adopted for the capacity models, while the delay model utilized Monte Carlo simulation techniques. An extensive data collection at 14 U.S. airports preceded model development. The models were validated by comparison of observed results with computation at three airports. An airfield capacity and delay handbook being developed as a result of this work is discussed.

From International Air Transportation, Proceedings of the Conference, San Francisco, California.

Maddison, D (Peat, Marwick, Mitchell and Company) Adakar, DB (Douglas Aircraft Company, Incorporated) Linn, RJ (American Airlines, Incorporated)

American Society of Civil Engineers Proceeding Mar. 1975, pp 123-141

ACKNOWLEDGMENT: International Aerospace Abstracts

ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

76A-10398

08 155834

#### APRON AND TERMINAL BUILDING PLANNING MANUAL

Planning recommendations are presented for terminal building areas and apron space. The apron and terminal building areas are defined as those areas undivided and limited by the curb roadway and associated parking on the landside and limited by the curb roadway and associated parking on the landside and taxiway access to the apron on the airside. The principal areas presented are apron, connector, terminal, curb roadways and parking. Space considerations are presented as they are affected by the four principal concepts and airport traffic volumes, types and station characteristics. A presentation of area and layout for all major elements of the terminal building is illustrated in tabular, graphic, and plan formats. Sources of planning information and guidance for the procurement and input of this information are provided. Gross terminal sizing recommendations for medium and long-range planning are given. Comparative costs for on and off airport projects are discussed.

Parsons (Ralph M) Company FAA-RD-75-191, July 1975, 340 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: NTIS

AD/A018120/LK

08 155839

#### THE APRON TERMINAL COMPLEX

The principal considerations in the planning of airport apron-terminal areas are described. The apron-terminal area is defined as the area limited by the curb on the landside and the taxiway access to the apron on the airside. The major functional areas of the apron-terminal complex (curb, terminal, connector, and apron) are defined and described. The four principal concepts for apron-terminal complexes, (pier, satellite, linear, and transporter) are analyzed and evaluated for suitability to specific airport situations, based primarily upon traffic levels, physical limitations, and station characteristics. The final report presents a consolidation of the conclusions, technical, economic, and operational advantages and limitations; and underlying assumptions related to each apron-terminal area complex concept. Inducted are tabular and graphic moderates to help in evaluating concepts.

Parsons (Ralph M) Company, Air Transport Association of America Sept. 1973, 157 pp

Contract DOT-FA72WA-2950

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

08 155851

#### MIRABEL-SCOPE FOR DEVELOPMENT 2020

The article surveys the facilities and plans for the new Mirabel Airport in Montreal which opened in late 1975. In terms of the amount of real-estate expropriated (for airport grounds proper and for control of land under air access routes), Mirabel rates as one of the worlds largest airport developments, serving Montreal which is a major inland waterway port. Elimination of nesting areas in the vicinity of the airport will minimize bird injection problems. The access road network and the airport land allocations (runways, taxiways, terminal area, aprons) are described. Detachable (mobile) gates and other passenger-handling facilities are heated, in addition to passenger-processing facilities within the terminal. Successive expansion phases though the year 2020 are envisaged in existing plans and allowed for by the extensive land acquisition program.

Shine, A Haley, P *Airport Forum* Vol. 6 No. 2, Apr. 1976, p 15, 4 Fig., 2 Phot.

ACKNOWLEDGMENT: Massachusetts Institute of Technology



08 155852

**CONCORDE AT THE AIRPORT**

Ground handling of Concorde at Heathrow (London) and at Bahrain is discussed with emphasis on speedy turnaround and avoiding loss on the ground of time gained in the air for passengers. Summer peaking of passenger lists, bunching of schedules and services for airports at certain times of day and days of the week extended waiting time on the ground (for boarding baggage reclaim) organization of aircraft refurbishment, positioning of airport service vehicles amount a parked Concorde, refueling problems (with the large number of tanks and valves taken into account), and baggage handling (check-in, loading, sorting, reclaim) are discussed. Travel times to and from airports are considered, and data on seat loading factors for Concorde raft now in service are reported. Detailed charts are provided on Concorde turnaround timetables and on airport service vehicle positioning.

Mayor, ER (British Airways) *Airport Forum* Vol. 6 No. 5, Oct. 1976, p 23, 8 Fig.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155867

**STRACS--A SOLUTION FOR SURFACE TRAFFIC CONTROL IN THE J.F. KENNEDY AIRPORT**

The paper describes the development of a cost effective Surface Traffic Control System (STRACS) for the J.F. Kennedy International Airport (JFKIA). Modular concepts permeate the system design in order to provide an evolutionary growth capability to achieve high standards of operation, at least by the time that all-weather take-offs and landings are operational realities. STRACS implies a complete system for the safe and efficient movement of aircraft, vehicles and emergency or rescue vehicles over the area encompassed between the terminal buildings and the points of takeoff and landing of aircrafts. The ground controllers can acquire status information throughout the JFKIA area at all times and be relieved of some of the burdensome tasks associated with routine assignment. The pilots can proceed at RVR's too low for visual tower contact in safety. The airport operator can provide all-weather service, both on a routine and emergency basis to aircrafts and to airport facilities.

From Traffic Control and Transportation Systems, Proceedings of the 2nd Symposium, Monte Carlo, Monaco, September 16-21, 1974.

Barber, JL (LFE Corporation)  
American Elsevier Publishing Company, Incorporated Proceeding 1974, pp 589-600

ACKNOWLEDGMENT: International Aerospace Abstracts

08 155892

**LAGOS AIRPORT PREPARES FOR THE YEAR 2000**

Lagos International Airport has long ceased to meet present air traffic requirements. It could perhaps have been modernized through a series of relatively minor operations, or a new one could have been built. Both these solutions have been rejected. Instead, the airport is now to be radically remodeled step by step over an extended period. The first stage of the work is expected to be completed in 1977. The master plan and details of the major construction operations are described.

de Villeneuve, LC *Airport Forum* Vol. 4 No. 1, Mar. 1974, p 29

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155895

**COMPUTER ANALYSIS OF AIRFIELD OPERATIONS**

In connection with a major expansion of the apron-gate area at San Francisco International Airport the number of aircraft gates will be increased from 56 to about 90. Two alternate plans were developed for increasing the number of gates. A computer-simulation approach was used for obtaining data regarding the performance of the two terminal schemes. The computer simulation was to provide information concerning the magnitude of aircraft delays, the cause of these delays, and lengths of the lines of waiting passengers. The results of the computer simulation were one of a number of factors which led to the selection of one of the two schemes being considered.

Horonjeff, R (California University, Berkeley) Maddison, D *Airport Forum* Vol. 4 No. 2, June 1974, p 41

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155898

**MAPLIN-THE OPERATIONAL FACTORS AND THEIR INFLUENCE ON THE DESIGN OF THE AIRPORT**

The paper reviews the possible future development of the air vehicle and the effect that the increase in size of the vehicle will have on the design parameters relating to the runways and taxiways. The design criteria which are related to operations in the lower visibility ranges are also examined so that comprehensive design parameters for the runway and taxiway system related to future technological changes are used for planning. Various runway layouts suitable for a high capacity airport are examined with particular reference to the layout chosen for Maplin. Probable movement rates are given together with an indication of possible future increases resulting from operational and technological development. The importance of a phased development plan so that individual areas of development contribute to the future whole while at the same time maintaining an efficient operation is considered.

From Airports for the BO's Proceedings of the 4th World Airports conference, London, England, 3-5 April 1973.

Champliss, GA (British Airports Authority, London)  
Institution of Civil Engineers Proceeding 1973, pp 119-123

ACKNOWLEDGMENT: International Aerospace Abstracts

08 155907

**CRITERIA FOR THE SITING OF MAJOR AIRPORTS**

There are comparatively few mandatory standards involved in airport location criteria, leaving a substantial area where all factors need to be weighed and compared against each other. This involves trade-offs between factors, some of which may be measured and valued and some of which remain more intangible. The techniques involved in such comparisons must incorporate both the physical and social sciences. The paper then considers four important criteria of airport location; noise, surface access, urbanization, and planning.

From Airports for the 80's. Proceedings of the 4th World Airports Conference, London, England 3-5 April, 1973.

Goldstein, A  
Institution of Civil Engineers Proceeding 1973, pp 169-174

ACKNOWLEDGMENT: International Aerospace Abstracts

08 155945

**AVIATION GROUND LIGHTING FOR ALL-WEATHER OPERATION**

Lighting installations for runways, approaches, taxiways, runway centerlines, and the VASI (visual approach slope indicator) and mini-VASI systems for indicating approach slope height and angle are discussed. Characteristics of liminaires, filter sets, and flush and elevated lighting fittings are dealt with. Attention is given to ICAO requirements, airport runway/taxiway/apron maintenance problems associated with lighting (damage, hazard to aircraft shidding off runway), wind and jet blast problems affecting lighting fittings.

Latin, M *Airport Forum* Vol. 7 No. 1, Feb. 1977, pp 31-34

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155946

**PROJECTED UTILIZATION OF WARM FOG DISPERSAL SYSTEMS AT SEVERAL MAJOR AIRPORTS**

No Abstract.

Weinstern, AI (Air Force Cambridge Research Laboratories) *Journal of Applied Meteorology* Vol. 13 No. 7, Oct. 1974, pp 788-795

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 155947

**A COMPARISON OF SEVERAL METHODS FOR THE CALCULATIONS OF AIRSIDE AIRPORT DELAY**

The two models under examination in this paper include one based on work by Oliver & Samuel and one based on work by Koopman. The former method examines the airport airside queues from a wholly deterministic standpoint using the actual flight times from tower data and average service time for arrival rate and service rate, respectively. The latter method assumes



a Poisson arrival rate and defines lower and upper bounds for delays based on a deterministic service rate and a Poisson service rate, respectively. Both models are executed using data from the airport tower at Schiphol Airport in Amsterdam, Holland. Airport capacity is treated as a variable in each of twelve runs which comprise the experiment. Demand is input in 60-minute, 30-minute and 15-minute time intervals for each of four profiles selected from the tower data. The results concur with expectations in that the Oliver 7 Samuel model consistently predicts delays below the Koopman band. The correlation between the two models improves the greater the peaking in the demand profile. If some of the delay ignored by the Oliver & Samuel model could be replaced artificially, the correlation would be excellent. The results are surprising from the standpoint that 30-minute time intervals produce better correlation than either the 60-minute or the 15-minute intervals. While the former case is expected, the latter is not and, in conjunction with other evidence, seems to indicate that spurious delays have entered the Koopman methodology as the time interval is reduced from 30 to 15 minutes. Additional research is required to further substantiate this claim.

Scalea, JC  
Massachusetts Institute of Technology MS Thesis June 1976, 78 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

08 158222

#### MICROWAVE FLIGHT AND LANDING SYSTEMS [Mikrowellen-anflug-und landesysteme]

The microwave landing system DLS is described. It is designed to replace the present standard ILS in 1985. The idea and advantages of the DLS concept are presented. [German]

*Nachrichtentechnische Zeitschrift* Vol. 29 No. 4, Apr. 1976

ACKNOWLEDGMENT: EI  
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08 158224

#### MLS--A PRACTICAL APPLICATION OF MICROWAVE TECHNOLOGY

A brief system overview of the U. S. candidate of the microwave landing system (MLS) is presented. Practical implementation of two types of ground antenna designs are presented, including measured data. Phased array designs are presented as high-performance implementations. Lens array designs have proven to be acceptable solution for limited-scan medium-performance requirements.

Cox, RM (Bendix Corporation) Sebring, JR *IEEE Transactions on Microwave Theory Technology* Vol. MTT No. 12, Dec. 1976

ACKNOWLEDGMENT: EI  
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08 158235

#### HUMAN FACTORS APPLICATIONS IN AIRPORT AIR TRAFFIC CONTROL

Task demands in airport air traffic control are examined in the context of new systems design. Traditional human factors approaches, and the optimal use of computer assistance is considered. Emphasis is placed on the role of the computer in providing both feedback and feedforward information for controllers.

Sixth Congress of the Intl Ergonomics Assoc and Proceedings of the 20th Annual Meeting of the Human Factors Society, University of Maryland, College Park, Maryland, 11-16 July 1976.

Stammers, RB (Aston University, England)  
Human Factors Society 1976, pp 400-402, 13 Ref.

ACKNOWLEDGMENT: EI  
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08 158237

#### HALF-PLANE SCATTERING APPLIED TO ILS GRADING CRITERIA

A technique for calculating the derogation in the difference in depth of modulation (DDM) signal, used for aircraft glide slope guidance, due to slightly rough ground surfaces is developed. The contributions to the scattered signal from diffuse and specular scatter are treated separately. The

diffuse derogation is calculated based on empirical data, and an average variation is presented. The specular contributions to the variation in the signal is calculated based on expanding the half-plane diffraction solution in terms of the ground roughness. A specular scattered deviation about the mean signal is then obtained by statistically averaging over normally distributed ground heights. Results of the analysis indicate that substantial relaxation in grading criteria can be effected.

Godfrey, JT (Westinghouse Electric Corporation) Hartley, HF Moussally, GJ Moore, RA *IEEE Transactions on Aerospace & Electronic Systems* Vol. AES No. 1, Jan. 1977, pp 2-10, 22 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

08 159710

#### STAGING RUNWAY EXPANSION BY DYNAMIC PROGRAMMING FOR WASHINGTON NATIONAL AND DULLES INTERNATIONAL AIRPORTS

A time-staging decision for a long-range runway expansion program has been developed by adapting the dynamic programming methodology to economic optimization for a given planning horizon. Specifically, major efforts are made to bring the model into a highly useful form and to further tie the theoretical concept to the working reality by testing the model on real-world examples. Washington National Airport and Dulles International Airport were selected as test cases. The results showed that National could best be served by adding a fourth runway and that Dulles already has too large a runway capacity for its air runway and that Dulles already has too large a runway capacity for its air traffic demand. Viewed in a multi-airport perspective for the Washington, D.C., metropolitan region, the possibility of improving both airport operations by shifting some portion of National's demand to Dulles was indicated. A thorough evaluation of the methodology and its applicability revealed that the developed model should be capable of greatly benefiting the planning of airport runway operations. /Author/

This article appeared in TRB Record 588, Airport and Air Transport Planning.

Yu, JC (Utah University) Kerr, RD (Virginia Polytechnic Institute & State University) *Transportation Research Record* No. 588, 1976, pp 11-17, 4 Fig., 8 Tab., 9 Ref.

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08 163478

#### APPLICATION OF DIMENSIONAL ANALYSIS TO PREDICT AIRPLANE STOPPING DISTANCE

A new technique has been developed to predict airplane braking distance performance in terms of aircraft parameters, runway environment, and brake control systems performance. A dimensional analysis technique was used to determine significant dimensionless groups or pi terms required to express the braking performance in equation form. A hardware-analog brake control simulator was used to gather experimental data necessary to determine the constants and exponents in the performance equation. Among the airplanes studied were the Boeing 727, 737, 747, the Lockheed C-141, and the McDonnell F-4. A prediction equation permits the calculation of stopping distance, assuming that proper information concerning airplane and weather parameters is available, as well as accurately measured tire-runway friction coefficients.

Wahi, MK (Boeing Company) *Journal of Aircraft* Vol. 14 No. 2, Feb. 1977, pp 209-214, 9 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

08 163482

#### A SLANT VISUAL RANGE/APPROACH LIGHT CONTACT HEIGHT SYSTEM ---AIRPORT. TRANSMISSIOMETERS FOR FOG MEASUREMENTS

A prototype slant visual range/approach light contact height (SVR/ALCH) facility was installed to determine whether or not a combination of presently off-the-shelf equipment could be used to predict slant path visibility. The primary system evaluated was a 100-foot instrumented tower located 1500 feet from each of two 160-ft towers with horizontal transmissiometers mounted at six levels. The instrumented tower provided data from a forward

scatter meter located at the 100-ft level and a transmissometer at the 5-ft level. Vertical fog structure measurements are described. A comparison is given of horizontal and slant visual range for advective fogs, the psychophysical aspects of SVR and ALCH are discussed, and the SVR/ALCH algorithm is explained. It is concluded that the candidate system will determine slant path transmission and adaptation luminance, but not slant path visual range.

From the conference on Aerospace and Aeronautical Meteorology (6th), El Paso, Texas, 12-15 November 1974.

Lohkamp, CW (Department of the Navy)  
American Meteorological Society Proceeding 1974, 4 pp

ACKNOWLEDGMENT: International Aerospace Abstracts

08 163485

## AIRCRAFT FUEL SERVICING

This Standard applies to fuel servicing of all types of aircraft on the ground. It does not apply to: (a) airborne fueling; (b) fueling of flying boats or amphibious aircraft on the water; or (c) draining and filling aircraft tanks during fuel system maintenance operations.

ANSI Standard Dec. 1974, 72 pp

ACKNOWLEDGMENT: EI

08 163486

## AIRCRAFT RECOVERY USING AIR CUSHION PLATFORMS

It has been repeatedly stated in aviation circles that with increasingly high traffic density at all major airports and rising costs of aircraft and service, two requirements are of crash: the recovery must be fast, especially if a runway is closed as a result of the crash; and secondary damage to the minimum. When examining these requirements, the air cushion platform with its high mobility over any surface and the level duty. Based on this supposition, the paper outlines the equipment, operational techniques, experience and future objectives of the use of air cushion platforms in aircraft recovery.

Intl Hovering Craft, Hydrofoil and Advanced Transit System Conference, Brighton, England 13-16 May 1974.

Parkes, GM (Hovertrailers International, Limited)  
Kalerghi Publications 1974, pp 103-109

ACKNOWLEDGMENT: EI

08 163490

## AN EXPLORATORY STUDY TO DETERMINE THE INTEGRATED TECHNOLOGICAL AIR TRANSPORTATION SYSTEM GROUND REQUIREMENTS OF LIQUID-HYDROGEN-FUEL SUBSONIC, LONG-HAUL CIVIL AIR TRANSPORT. FINAL REPORT

A baseline air terminal concept was developed which permitted airlines and the airport to operate JP-or LH2-fueled aircraft at common terminal gates. The concept included installation of hydrogen liquefaction and storage facility on airport property, as well as the fuel distribution system. The capital investment and hydrogen-related operating costs to the airlines were estimated.

Boeing Company NASA-CR-2699, Sept. 1976, 176 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

08 163499

## ELECTROSTATIC CHARGING SURVEY OF AIRPORT FUELING SYSTEMS

Studies of the electrostatic charging characteristics of aircraft fuels and ground fueling equipment were extended to six major airports in the United States. 184 runs involving 31 different fuels were carried out by using 105 hydrant servicers and trucks. Relative charging tendencies of 15 different types and makes of separators, coalescers and filter/monitor elements were obtained. Surface voltages were measured in 15 runs at three airports. Fuel effects continued to be a major variable in filter charging as concluded in an earlier CRC study of filtration equipment. As in the earlier study, teflon-coated screen separators charged significantly less than paper separators. No differences were observed between coalescers. Filter/monitors

showed some evidence of high charging activity. With current model paper separators one of 31 fuels was a "high charging" type and about 4% of the runs exhibited charge levels above the high charging criteria developed in this study. All charges from teflon-coated screens were well below these levels. The study also showed the importance of the charge flow concept when equipment was operated with differing flow rates. While some relationships could be established between charge levels and surface voltages in receiving tanks, other factors such as tank geometry and meter viewing field had a major influence on surface voltages and limiting the usefulness of these measurements.

Coordinating Research Council, Incorporated CRC Report 473, Dec. 1974, 144 pp

ACKNOWLEDGMENT: EI

08 163502

## ESSO LONDON AIRPORT REFUELLING CONTROL CENTRE REDESIGN--AN ERGONOMICS CASE STUDY

Growth in traffic through London Airport (Heathrow), shortening of aircraft turn-around times, and other factors were reflected in the Esso Company's refuelling service by additional stress on their controllers and by shift supervisors spending time backing-up the controller instead of on general supervision duties. After an initial review of the ergonomic redesign of the control functions and the control offices at the Esso Refueling Control Centre, illustrating the need for a comprehensive approach to this type of problem.

Shackel, B Klein, L (Loughborough University of Technology, England)  
Applied Ergonomics Vol. 7 No. 1, Mar. 1976, 37-45

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

08 163511

## MONITORING THE MOVEMENT OF WAKE VORTICES AT KENNEDY AND STAPLETON AIRPORTS

During the summer and fall of 1973, the transportation systems center collected an extensive amount of data on the motion of aircraft wake vortices. Two test sites were instrumented the John F. Kennedy International Airport in New York and the Stapleton International Airport in Denver, Colorado. The vortices from over 10,000 landing aircraft were recorded, and the motion of the vortices was correlated with the ambient meteorological conditions. The results of these measurements coupled with user requirements led to the description of three basic vortex avoidance systems.

Proceedings of the 5th Annual Symposium, Advancements in Flight Test Engineering, Anaheim, California, 7-9 August 1974.

Hallock, JN (Transportation Systems Center)  
Society of Flight Test Engineers 1974, 5 pp

ACKNOWLEDGMENT: International Aerospace Abstracts

08 163512

## MICROPROCESSORS IN DISPLAY SYSTEM

Two microprocessor (MPU) projects recently completed by a British company, are a teletext encoder (for numerous television organizations experimenting with teletext operations) and an airport flight information display system (designed for the British Airports Authority). Current developments are a hospital laboratory-test display system and an advanced teletext encoder particularly suitable for testing the quality of teletext decoding systems. All of these projects require intelligent control and, therefore, are based on the Motorola MC6800 multi-chip microprocessor.

Telecommunication Journal Vol. 43 No. 12, Dec. 1976, pp 708-709

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

08 163515

## Q-GERTS. SUMULATION OF AIR TERMINAL CARGO FACILITIES

A Q-GERT simulation model for air terminal cargo facilities was designed. The model is adaptable to most any specified terminal with no reprogramming required. Each adaptation can be accomplished with approximately

two man-days. The model was developed primarily to determine saturation capability and bottlenecks in air terminals. When output rate is defined in terms of aircraft loads, an average 24 aircraft loads handled per day with maximum values up to 30 loads resulted.

Avterio, VJ (Air Force Military Airlift Command)  
Instrument Society of America 1974

ACKNOWLEDGMENT: EI

#### 08 163517

##### NEW STOCKHOLM AIRPORT WILL HAVE FIXED 400 HZ GROUND POWER SYSTEM

In the new terminal building of Stockholm's Arlanda Airport, now under construction, a fixed 400 Hz ground power system with a centralized power source will be installed to serve 20 aircraft simultaneously. This ground power system features a unique, solid-state line drop compensator that completely conceals the reactive voltage drop in each line serving a load regardless of unbalances or loading of any other aircraft being served by the same generator source. Using line drop compensators of this type, a centralized 115/200 V, 400 Hz source can provide power to any number of aircraft within the total power rating of the central source the voltage regulation being plus or minus 2 per cent. The line drop compensator consists of various reactive elements inter-connected in such a manner that when applied to a 400 Hz power cable, the compensator effectively makes that cable appear to the power source as a negligible series resistance, rather than an appreciable reactive series load.

*Aircraft Engineering* Vol. 47 No. 8, Aug. 1976, pp 25

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 08 163524

##### SOLAR HEATING SYSTEM FOR AIRPORT PAVEMENT SNOW, SLUSH, AND ICE CONTROL

The technical and economic practicability of a solar energy pavement heating system for use in snow, slush and ice control on airport runways, taxiways and ramps is discussed. The preliminary design considers the winter climate, the air traffic density and the operating and total system costs. Cost comparison between a solar, electrical and a steam fired system are given together with a "SNOP" number which is unique to each airport. Through use of the "SNOP" number, each airport management can predict when the practicality of a solar system should be considered.

Proceedings of the Symposium on Alternate Fuel Resources, Santa Maria, California, 25-27 March 1976.

Bromley, E, Jr D'Aulerio, H (Federal Aviation Administration) Pravda, M (Dynatherm Corporation)  
Western Periodicals Company Proceeding 1976, pp 58-69, 6, Ref.

ACKNOWLEDGMENT: International Aerospace Abstracts

#### 08 163526

##### SOME EARLY PERSPECTIVES ON GROUND REQUIREMENTS OF LIQUID HYDROGEN AIR TRANSPORTS

The introduction of liquid hydrogen as a fuel for large, long haul air transports requires an integrated approach involving the air terminal authorities and the liquid hydrogen suppliers, as well as the airline operators and the air transport manufacturers. To illustrate the scope of the requirements necessary to support large air transports at the air terminals, perspectives are drawn to surface some concerns each of the principals may have to face, and to identify those that will require cooperative effects to obtain integrated solutions.

From Proceedings of the 1st World Hydrogen Energy Conference, Miami University.

Korycinski, PF  
Langley Research Center Proceeding Vol. 3 Mar. 1976, 24 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
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#### 08 163527

##### SPEED DICTATES SOLID STATE LOGIC FOR AIRPORT REFUELING SYSTEM

A refueling system installed at the Dallas/Ft. Worth airport is described. The refueling operation is based on a demand type system, in which pressure is maintained on all lines at approximately 110 psi. When a refueling cart connects to an outlet and begins to draw fuel from the system and into an airplane, the resulting flow from the pump station automatically brings on the number of transfer pumps needed to supply the required fuel and to maintain the required pressure. Features of the logic circuitry are pointed out.

Sandstrom, J (Integral Systems, Incorporated) *Control Engineering* Vol. 21 No. 10, Oct. 1974, pp 124-126

ACKNOWLEDGMENT: EI  
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#### 08 163531

##### THE AIR TRAFFIC CONTROLLERS PROBLEMS ASSOCIATED WITH GROUND MOVEMENT CONTROL

Ground movement control (GMC) operations, GMC personnel duties, allocation of parking stands and aircraft delays off-stand, work in progress around the airport, radiotelephone communication problems (between ATC center and ground operations), and delineation of airport areas are discussed. Cases where conventional distinctions between apron, maneuvering areas, and parking areas become blurred are considered. The principal tasks faced by ground movement controllers during busy hours and the most taxing problems encountered when airport surface work (earth moving, construction works, emergency repairs, route markings) is in progress are outlined. Constraints and difficulties of GMC at night or in poor visibility are sketched.

*Controller* Vol. 15 No. 4, Nov. 1976, pp 35-38

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A77-25600

#### 08 163533

##### THE OBSERVATION OF BIRDS WITH WEATHER AND AIRPORT SURVEILLANCE RADARS

The application of radar to detect, quantify, and monitor the movements of birds is emphasized. Of all the approaches currently being used to reduce the hazards that birds pose to aviation, radar techniques offer the promise of definite results. The distribution of surveillance radars at numerous locations throughout the United States, particularly in the vicinity of active airfields, adds greatly to the attractiveness of this approach. The review of radar techniques and bird migration information should greatly aid radar operators in recognizing the various types of echoes from birds displayed on weather and air traffic control radars, in estimating the numbers of birds passing overhead, and gathering information on the altitude of the birds aloft. Use of these techniques should greatly benefit aviation interests, both civilian and military, by reducing the number of bird/aircraft collisions and improving flight safety.

Gauthreaux, SA, Sr  
Clemson University Final Rpt. AF-AFOSR-1974-71, Apr. 1974, 50 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
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AD-780597

#### 08 163534

##### THE VARIABILITY OF AIRFIELD VISIBILITY-A PRELIMINARY ASSESSMENT

Results are presented concerning temporal and spatial variability of automated visibility measurements along a runway in conjunction with lower measurements. Comparisons are also made with variability statistics drawn from multi-transmissometer systems evaluated for the FAA.

Chisholm, DA Kruse, H  
Air Force Cambridge Research Laboratories AFCRL-TR-74-0027, Jan. 1974, 31 pp



ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

08 163538

## USING LIDAR FOR MEASURING VISIBILITY

The performance of a slant visibility equipment and the data processing techniques used are described. Special attention is given to the correlation data which compares the accuracy of the slant visibility system to that of a recognized transmissometer. It is shown that the use of the lidar technique in a SVR (Slant Visual Range) system which would supplement the RVR (Runway Visual Range) Systems at airports may very well become a near future application especially when reliable eye-safe lasers are available at a reasonable price.

From AGARD Conference, Lyngby, Denmark, October 27-31, 1975.

Ruger, JF

Advisory Group for Aeronautical Res & Dev-NATO Conf Paper No. 183, Paper 44, 1976, 8 pp, 7 Ref.

ACKNOWLEDGMENT: EI

08 163539

## VISUAL LANDINGS IN REGIONAL AND LOCAL AIRPORTS

The basic plans for the ground lighting facilities worked up by AEG-Telefunken in Cooperation with the German Federal Institute for Flying Safety are presented. The program is broken down into five sections, each section offering recommendations for the different situations found at most regional airports. These sections are (1) lighting the takeoff and landing runways, (2) obstacle lighting and beacons, (3) runway beaconing, (4) approach beaconing, and (5) switching and control systems.

Schellenberg, S (Linguistic Systems, Incorporated)

National Aeronautics and Space Administration NASA-TT-F-15177, 1972, 15 pp

ACKNOWLEDGMENT: National Aeronautics and Space Administration  
ORDER FROM: NTIS

08 163540

## WELLINGTON AIRPORT EXTENSION--ADDITIONAL SEA PROTECTION

This paper describes additional sea protection measures undertaken at the south end Wellington Airport after heavy seas damaged the existing protection. The project included the manufacturer of high density concrete used in the construction of primary protection armor, and also the construction of rock gabions as secondary protection.

Chisholm, DH *New Zealand Engineering* Vol. 31 No. 5, June 1976, pp 157-161, 6 Ref.

ACKNOWLEDGMENT: EI

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08 200606

## CONGRESSIONAL AIRPORT CONGESTION STUDY, PART 2

The report was prepared to provide information on principal airport congestion and its cause and effect. The study is a consolidation of information obtained from various data sources, including government and industry from which a comprehensive analysis was made to determine the probable cause and degree of air carrier delay in operations at major airports, included in the study is an analysis of load factors and composition of passenger loads, a detailed analysis of peak period delay data and a summary of operations and delay data for the airports studied for the study timeframe. The study summarizes the probable causes of air carrier delay in operations at the major airports and recommendations to alleviate the source of delay. /author (gra)/

Constantz, JC Tracy, SM Williamson, WR Hilgert, RJ Bingham, WA Hintze, C Autl, RL Dougherty, WE Kozlek, PS  
Civil Aeronautics Board Dec. 1970, 2909 pp

ACKNOWLEDGMENT: International Aerospace Abstracts  
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08 202302

## ECONOMIC UTILIZATION OF GENERAL AVIATION AIRPORT RUNWAYS

The urban general aviation airport economics is studied in detail. The demand for airport services is discussed, and the different types of users are identified. The direct cost characteristics of the airport are summarized; costs to the airport owner are largely fixed, and, except at certain large airports, weight is not a significant factor in airport costs. The efficient use of an existing airport facility is explored, with the focus on the social cost of runway congestion as traffic density at the airport builds up and queues form. The tradeoff between aircraft operating costs and airport costs is analyzed in terms of runway length. The transition from theory to practice is treated, and the policy of charging prices only on aircraft storage and fuel is felt likely to continue. Implications of the study from the standpoint of public policy include pricing that spreads traffic peaks to improve runway utilization, and pricing that discriminates against aircraft requiring long runways and causes owners to adopt V/STOL equipment. /author/

Piper, RR

Education Research, Incorporated Apr. 1971, 235 pp, Refs

Contract NAS2-5737

ACKNOWLEDGMENT: International Aerospace Abstracts

08 203781

## WHERE IS THE 'OPTIMUM' RUNWAY SYSTEM-PROPOSALS FOR HIGH-CAPACITY RUNWAY SYSTEMS AT MAJOR AIRPORTS

it is pointed out that under present operational conditions a large number of aircraft very often have to wait in the stack because the capacity of the runway facilities is too low to accept approaching aircraft fast enough. In addition, aircraft have to wait in line for takeoff. Time losses connected with this procedure are not acceptable in an era of mass transport. The runway systems of the future must be designed in such a way that an 'optimum' number of aircraft movements is possible. Guidelines for such runway systems are discussed together with an all-runway airport, a three-and four-runway system with conventional taxiways, and a narrow eight-runway system. /iaa/

Schnauffer, K *Airport Forum* Mar. 1972, 6 pp

ACKNOWLEDGMENT: International Aerospace Abstracts

08 203791

## PARALLEL RUNWAY SPACING

in connection with continuously increasing air traffic, it is necessary to increase the capacity of the airport by independently operated runways. Aspects of minimum runway spacing compatible with prevailing safety standards are investigated. A sensitivity analysis is conducted in order to obtain information about the system parameters that have the greatest influence on the runway spacing. The most critical parameter is the total command delay time. Another significant parameter is the bank angle. The penetration probability, on the other hand, has little influence on the intervention zone width. It is found that an increase in the data acquisition rate is more effective than aspects of accuracy. /iaa/

Kullstam, A *Navigation* Vol. 19 1972, pp 19-28, 5 Ref

ACKNOWLEDGMENT: International Aerospace Abstracts  
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08 203798

## EXTENSION OF A CAPACITY CONCEPT TO DUAL USE RUNWAYS AND MULTI-RUNWAY CONFIGURATIONS-FINAL REPORT

the document is based on a previous investigation which yielded a maximum throughput rate concept for the capacity of a facility serving a single stream of customers of various types, in particular a runway serving a stream of landing aircraft. The present study develops four extensions of this concept, of progressively broader scope, to facilities serving several customer-streams. An explicit capacity-formula is derived for each extension. The second extension is applied to a runway serving both landings and takeoffs, while the final extension provides a theoretical basis for evaluating the capacity of complexes of runways at airports. An appendix gives several illustrations of how such results can be used to analyze the enhancement of capacity of appropriate settings of operational parameters. /author/

Horn, WA

National Bureau of Standards NSB-10593, Dec. 1971, 113 pp, Refs.

ACKNOWLEDGMENT: Scientific & Technical Aerospace Repts  
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AD-744481

08 207518

#### RUNWAY MARKINGS-A SAFETY FACTOR

modern airport runway requirements and practices are discussed. The requirements discussed include: visibility by day in diffuse lighting (I. E., sufficient whiteness), adequate night reflection value, color stability, durability, antiskid properties, heat resistance up to 200 C., imperviousness to aircraft fuels and lubricants, good adhesion, and prompt applicability assuring noninterference with flight operations at airports of high traffic density. Some of the techniques used for meeting these requirements are briefly reviewed. /iaa/

Bollag, M *Airport Forum* June 1972, pp 111-2

ACKNOWLEDGMENT: International Aerospace Abstracts

08 260232

#### EVALUATION OF AIRFIELD PERFORMANCE BY STIMULATION

Through the application of computerized simulation techniques, the future operation of a proposed airport can be evaluated prior to construction. TAMS developed and used a fast-time computer simulation to evaluate the performance of the proposed Dallas-Fort Worth Regional Airport. This simulation traces each aircraft operation between arrival and departure, including runway, taxiway, and gate selection and occupancy under various operating conditions. Output of the program provides total travel time and cost per aircraft type and by airline, delay times and location, facility utilization frequencies, and a computer-generated motion picture showing aircraft ground movements.

Brant, AE, Jr McAward, PJ, Jr (Tippetts-Abbett-McCarthy-Stratton)  
*ASCE Journal of Transportation Engineering* Vol. 100 No. TE2, Proc. Paper 10552, May 1974, pp 505-522, 5 Fig., 4 Tab.

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## Chapter 9

# LANDSIDE DESIGN AND OPERATIONS

09 127047

### STUDY OF SERVICE TIMES AND DELAYS FOR AIRPORT PARKING GARAGE

This report describes the operations and activities involved in servicing vehicles as the San Francisco Airport parking garage, San Francisco, California. The data for the report was obtained by observing vehicles being processed through a lane at the exit. Observations during the data collection phase of this study and analysis of the data indicate that delays, efficiency of a cashier, volume of vehicles and payment of fees were important parameters that influence the service time. Parameters that influence delay consisted of payment of fee by credit cards, payment of fee by check, lost tickets and inquiry of directions.

Briscoe, V

California University, Berkeley MS Thesis Aug. 1975, 15 pp

09 131154

### AIRPORT LANDSIDE CAPACITY

Reports and papers presented at the Conference on Airport Landside Capacity are contained in this publication. These reports and papers address the following issues: (1) identification and measurement of levels of service and capacity of airport landside elements; (2) providing and managing airport landside capacity; (3) constraints and their impacts on airport landside capacity; (4) influence of airside and off-airport factors on landside capacity; and (5) alternative methods for providing landside capacity at existing sites. Conference participants represented all groups and agencies that are in some way involved in airport landside operations. A concise list of conference findings appears at the beginning of the publication.

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

*Transportation Research Board Special Reports* No. 159, 1975, pp 1-294, Figs., Tabs., Refs.

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09 131155

### AIRPORT LANDSIDE CAPACITY. INTRODUCTION

These introductory remarks to the reports and papers presented at the Conference on Airport Landside Capacity establish the purpose of the conference and the issues addressed. It is pointed out that the landside portion of airports may have as critical an impact on the level of service and capacity as the airside. This conference is seen as a first step in exploring the needed research and development in this vital area.

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

Heathington, KW (Tennessee University, Knoxville) *Transportation Research Board Special Reports* No. 159, 1975, pp 1-2

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09 131156

### AIRPORT LANDSIDE CAPACITY. CONFERENCE SUMMARY

This summary of the proceeding of the Conference on Airport Landside Capacity attempts to reflect as objectively as possible what each workshop considered or decided. Included also are positions taken in the general papers and the workshop resource papers. The views presented, therefore, are not necessarily those of the author or those of any one of the conference participants. On no issue was there a unanimous opinion, and on several issues there were strong minority views. The many points developed by the conference participants are here summarized and organized under 9 headings: definition of landside, capacity and the aviation system, capacity and level of service, peaking, multiple jurisdiction, balance, forecasting, financing, and federal aid. A final section comments on the conference research recommendations, which are included as the last chapter in this report.

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

Gellman, A (Gellman Research Associates, Incorporated) *Transportation Research Board Special Reports* No. 159, 1975, pp 6-12

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09 131157

### IMPORTANCE OF AIRPORT LANDSIDE CAPACITY

Airport terminals and roadway and parking systems have reached or are rapidly approaching critical stages or congestion. To alleviate this condition we need to quantify airport landside capacity, to produce some analytical tools for better planning, to identify areas in which engineering and research and development efforts can be applied to cope with the congestion problem, and to provide legislation for extending the Airport Development Aid Program, which will make federal funds available for construction or improvement of terminal facilities. These are the conclusions reached in this paper after examining the size and shape of the congestion problem. More specifically, it is suggested that we cultivate a more effective interface among the multijurisdictional agencies that influence the airport-urban relation, that we conceive of better ways to divert or absorb automobile traffic, and that we look more closely at airport activity forecasts in our efforts to achieve an effective balance between airside and landside capacity.

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

Barnum, JW (Department of Transportation) *Transportation Research Board Special Reports* No. 159, 1975, pp 13-16

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09 131158

### PRIMER FOR ANALYSIS OF AIRPORT LANDSIDE CAPACITY

At major airports in several countries, the use of high-capacity aircraft and improved air traffic control systems has emphasized the constraints imposed on providing increased landside capacity. In some cases, adjacent development has prevented further expansion of passenger terminal facilities and contributed to the decision to build an additional airport to serve the same metropolitan area. This paper analyzes the airport landside functions and their relations and argues the need to assign priorities to each airport function in terms of access to the runway system. Lower priority uses should be assigned to remote areas of the airfield so that higher priority uses might expand into the vacated land close to the runways. Thus, land area is the fundamental factor in determining landside capacity. Where land is constrained, as in many metropolitan airports, effective expansion and more efficient use of the airport land area could be achieved through the use of remote and off-site land for certain functions that do not require access to the runway system. /Author/

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

*Transportation Research Board Special Reports* No. 159, 1975, pp 17-34, 8 Figs., 1 Tab.

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09 131162

### IDENTIFICATION OF LEVELS OF SERVICE AND CAPACITY OF AIRPORT LANDSIDE ELEMENTS

This report identifies the objectives of Workshop 1, which are as follows: (1) identify the dimensions of service relevant for expressing and assessing the level of airport landside operations; (2) suggest level-of-service criteria for various users of airport landside capacity under the full range of congestion conditions; (3) for various airport development plans and strategies, determine the levels of service required to meet the needs of all airport users; and (4) recommend a research and development program that will be useful in determining acceptable levels of service for all users of airport landside systems and subsystems. Workshop 1 discussions led to the conclusion that many elements, including passengers, baggage, visitors, employees, freight, and services, have a direct impact on airport landside capacity and levels of service and are in competition for space and services. However, the passenger is the most important of these elements, and all improvements should evolve around the passenger's needs for space and service. The following definition of capacity was suggested by the workshop participants: Capacity is the physical provision required for a given demand at a given at a specified level of service. The landside thus includes all the intra-airport access roads and ramps, internal distribution systems, parking facilities, curbside loading and unloading, terminal buildings, and that part of the apron around the plane used to service the passengers.

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal



Aviation Administration, U.S. Department of Transportation. Heathington, KW Jones, DH (Tennessee University, Knoxville) *Transportation Research Board Special Reports* No. 159, 1975, pp 72-91, 2 Fig., 5 Tab., 1 Ref.

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#### 09 131163 IDENTIFICATION AND MEASUREMENT OF CAPACITY AND LEVELS OF SERVICE OF LANDSIDE ELEMENTS OF THE AIRPORT

Since the mid-1960s, air travelers have faced increasing inconvenience, frustration, and delays in the landside portion of their air trips. Ever-increasing numbers of passengers and the continuing introduction of higher capacity aircraft have created bottlenecks and congestion throughout the landside environment at peak hours and have placed tremendous strains on terminal facilities. Comfort and convenience of passengers in the airport landside are directly related to the capacity and the levels of service provided. Although airport congestion is fully apparent to operators of major airports and to their users, the concepts of capacity and level of service as they relate to the landside have yet to be fully understood. The concept of level of service is particularly difficult to understand, for it relates to quality, and quality, by definition, is subjective. This paper first discusses briefly the background of air transportation development and its effect on the airport landside environment today and then describes the basic functions and facilities of the landside. It then defines capacity and level of service within the context of the airport landside and examines the problems connected with developing meaningful measures of level of service. Existing landside planning criteria that have evolved during the years are reviewed, and possible measures of capacity and level of service for landside facilities are outlined. /Author/

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

Brink, M Maddison, D (Peat, Marwick, Mitchell and Company) *Transportation Research Board Special Reports* No. 159, 1975, pp 92-111, 1 Fig., 3 Tab., 13 Ref.

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#### 09 131164 SIMULATION METHODS FOR AIRPORT FACILITIES

The most realistic method of quantitatively approaching airport landside traffic problems appears to be computer simulation of airport landside traffic flows. This paper describes how the simulation of the landside portion of an airport complex can be used to represent or model the airport landside system to accurately determine the flow and holding capacity and the associated delays of the airport landside. A review of existing computer simulation models indicates that the Bechtel and TAMS models are most suitable for this purpose. They can produce the required distributions of delay, queue lengths, and occupancies for the boundaries specified. The major adaptation that would appear necessary to complete the landside analysis capability would be including a model of the curbside as a server of finite capacity rather than representing the time spent at curbside as a dwell time.

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

McCabe, L Carberry, T (Transportation Systems Center) *Transportation Research Board Special Reports* No. 159, 1975, pp 112-122, 7 Fig., 3 Tab., 10 Ref.

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#### 09 131165 PROVIDING AND MANAGING AIRPORT LANDSIDE CAPACITY

This report identifies the objectives of Workshop 2, which are as follows: (1) examine the criteria that have been used for determining whether new landside capacity is required and consider whether they are sufficient to support judgments concerning physical, institutional, financial, and timing needs; (2) determine whether additional or changed criteria can be developed to improve the judgmental process and recommend areas for research and development; (3) consider the methods that can be used to provide and

support new landside capacity when improved use of existing facilities will not suffice; (4) examine the role of airport management in achieving the required levels of landside capacity in the most cost-effective manner; (5) recommend management in the performance of its role; and (6) recommend research and development programs that will be useful to airport management confronted with problems of landside capacity. Workshop 2 tried to evaluate the usefulness of various criteria to providing new or additional landside capacity. Participants viewed these problems as airport management tends to see them. The major conclusions of the workshop were that purely technical criteria have been overemphasized and that increased emphasis must be given to economic guidelines, particularly since reliable long-term air traffic forecasts do not exist. It was recommended that landside development costs should be developed for a range of possible forecast values so that planners and decision makers can weigh the alternate costs associated with each level of projected demand before making final decisions. Such a practice would provide an indication of the cost of error in overestimating or underestimating and would help to ensure that the courses of least versus highest risk are given economic visibility.

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

Fallon, AJ (Niagara Frontier Transportation Authority) *Transportation Research Board Special Reports* No. 159, 1975, pp 123-126

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#### 09 131167 PROVIDING AIRPORT LANDSIDE CAPACITY

The capacity of the airport landside (which is the entire airport except runways, taxiways, and parking aprons) generally has not been determined by any set of criteria. Acceptable criteria have had reasonable use in determining capacity requirements for that portion of landside that comprises passenger terminal, cargo terminal, on-airport roadway systems, and automobile parking. Among factors that have contributed to unsatisfactory landside capacity conditions are (a) lack of appropriate business and economic factors; (b) failure to consider landside as a whole and to establish priority of use for available land; (c) unreliability of forecasting; (d) absence of economic justification and cost parameters that result in burdensome costs and do not correlate useful life and investment amortization; (e) escalation of "gamesmanship" and acrimony between airport managements and airline representatives; and (f) lack of nontechnical criteria sufficiently comprehensive to provide coverage of pertinent areas of consideration, including geographical location priorities, economic justifications, effective costing, reasonable forecasting, fixing of responsibilities, and management objectives. /Author/

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

Callahan, RH (Arnold Thompson Associates, Incorporated) *Transportation Research Board Special Reports* No. 159, 1975, pp 143-152, 2 Fig., 3 Ref.

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#### 09 131168 CONSTRAINTS AND THEIR INFLUENCE ON AIRPORT LANDSIDE CAPACITY

This report identifies the objectives of Workshop 3, which are as follows: (1) identify the most serious constraints on airport landside capacity and group them in related categories; (2) identify the various ways in which these constraints affect landside capacity; (3) develop forecasts of the type and character of constraints that will likely influence airport landside capacity and capacity requirements during the next 20 years; and (4) recommend research and development projects that will extend knowledge of the effect of the various constraints on airport landside capacity and identify means of reducing the effect of those constraints. Workshop 3 identified 9 categories of items relating to airport landside constraints. These include sociopolitical, regulatory and institutional, physical characteristics, financial, operational, airport management, technical, economic, and environmental constraints. Participants differentiated between short- and long-term constraining influences as a device to assist with establishing priority recommendations for the research and development projects that are recommended. The attempts to assign priorities, however, were unsuccessful. Much of the discussion

centered on subjects related to the creation of a social and political climate for stimulating development projects designed to increase landside capacity. Another major area of discussion concerned ways to level out the peaks and valleys of landside traffic. In reviewing their work at the conclusion of the conference, participants recognized that they had emphasized items that led to a lowering of demand for landside capacity through better use of existing facilities.

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

Miller, GA (California Department of Transportation) *Transportation Research Board Special Reports* No. 159, 1975, pp 153-156, 1 Tab.

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## 09 131172

### AIRPORT AIRSIDE AND LANDSIDE INTERACTION

This paper explores and examines some of the principal interactions between 2 elements of the airport-the airside and the landside-and how physical and operational improvements to each element are assessed in the context of the interaction. A brief description of the airside and landside elements is presented, and the most important factors affecting the interaction between the elements are outlined. In addition, recent advancements in the state of the art in determining airside capacity and delays are summarized. The principal influences of the landside on airside activities and development are limited to the apron- gate area component of the airside and are capable of being accommodated without serious conflict with other airport developments. By comparison, the principal influences of the airside on landside activities stem primarily from the fixed-point servicing requirement of airline aircraft, which occurs on the apron-gate area component of the airside. The extent of these influences is largely dependent on the degree of separation of the 3 basic operational areas of the landside: the aircraft-passenger processing area, the passenger collection point, and the access interface area. At most airports, these 3 operational areas are contiguous, and the influence of the airside on the landside, therefore, is substantial. Finally, the requirement, desirability, and practicality of balancing the airside and landside in various ways are addressed. /Author/

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

Hom, RE Orman, JC (Peat, Marwick, Mitchell and Company) *Transportation Research Board Special Reports* No. 159, 1975, pp 196-208, 4 Fig., 1 Tab., 10 Ref.

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## 09 131173

### AIRPORT LANDSIDE AND OFF-AIRPORT INTERACTION

Traditionally, airport planning efforts have been directed toward developing operational and economic efficiency within the airport landside and airside. Recently, these efforts have recognized the importance of maintaining equilibrium between the airside and the landside. This paper expands the scope of airport planning by focusing attention on off-airport activities that interact with the airport landside. The material presented assesses the relations between landside functions and off-airport activities. The activities relevant to the landside and off-airport interaction are identified, and the demand for and supply of off-airport activities are reviewed with emphasis on consumption and production. Findings and recommendations for alternative approaches for balancing the airport landside and off-airport capabilities are presented. /Author/

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

Negrette, AJ (Sacramento County Department of Airports, Calif) *Transportation Research Board Special Reports* No. 159, 1975, pp 209-216, 2 Fig., 4 Tab., 7 Ref.

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## 09 131174

### AIRSIDE AND OFF-AIRPORT FACTORS AND LANDSIDE CAPACITY

The California Department of Transportation is developing a multimodal transportation plan that includes airports. The 3 basic air and ground

interface components-airside, landside, and off-airport-incorporate different jurisdictional, operations, and financial constraints. An understanding of these is critical if they are to be coordinated into an overall transportation plan. This paper discusses some of the implications of these and how California is working to address related issues. /Author/

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

Sweet, CP, Jr (California Department of Transportation) *Transportation Research Board Special Reports* No. 159, 1975, pp 217-224, 3 Ref.

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## 09 131177

### METHODS TO INCREASE LANDSIDE CAPACITY AT EXISTING AIRPORTS

Significant increases in terminal use can be obtained by avoiding sharp peaks during certain hours of the day and by adopting various changes in operating procedure. Among the solutions mentioned are charging aircraft parking from parallel to nose in, using remote aircraft parking, using transporters, combining hold rooms, and automating ticketing and baggage handling. It should be recognized, however, that an airport fulfills a complex series of functions and what we cannot increase the capacity of one system without taking into account its effects on other subsystems further along the line. Therefore, an accurate knowledge of a station's ability to handle present-day traffic at acceptable levels of service is a prerequisite for any successful expansion program. /Author/

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

Klingen, LG (Eastern Air Lines, Incorporated) *Transportation Research Board Special Reports* No. 159, 1975, pp 249-255, 1 Fig., 2 Tab.

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## 09 155576

### LESSONS IN CONVENIENCE

The Tampa International Airport in Florida is a prime example of efficient use of existing airport land. While vertical expansion of terminal facilities may be more expensive to build in the first stage, it may also be the cheapest in the long term because the total life of the airport can be extended almost indefinitely, and passenger convenience can be maximized to its fullest by reducing total walking distance to around 600 ft.

Meehan, JA (Reynolds, Smith & Hills) *Airports International* No. 41, Aug. 1974, pp 26-27

ACKNOWLEDGMENT: Massachusetts Institute of Technology

## 09 155586

### PASSENGER GROUND TRANSIT SYSTEMS

Three new ground transit systems are described: automatic shuttle trains; prototype capsule-type vehicles; and moving walkways. The shuttle train system at Tampa International Airport incorporates a passenger transfer system which connects the main Landside building with the outlying Airside building where gate check-in, passenger holding and related ramp functions are conducted. A prototype overhead monorail system installed at Dallas-Fort Worth airport, consists of individual cars holding 14 passengers or up to 6,000 pounds of baggage operating along almost a mile of elevated track between the parking lot and terminal lobby. Two other systems being evaluated at the same airport, consist of small passenger transfer modules, containerized air cargo modules will be loaded and unloaded from aircraft by automated transfer systems. A conveyor system is described which can handle 22,000 passengers an hour over distances ranging from 1000 ft. to several miles.

*Airport Services Management* Vol. 10 No. 8, Aug. 1970, pp 24-27

ACKNOWLEDGMENT: Federal Aviation Administration Library

## 09 155601

### AIRPORT ACCESS AND CIRCULATION

Factors associated with environmental constraints in airport systems planning have led to an emphasis on airport ground access and intra-airport



transit planning. The choice between highways and mass transit and the advantages and disadvantages of each are considered. Rapid transit links which are unable to generate patronage are discussed with reference to the airport rapid transit connector in Cleveland, Ohio. A program to construct a TACV system between Dallas and Fort Worth connecting both cities with the new regional airport is noted. In Houston, private developers have built 4 satellite terminals on major transportation corridors in the metropolitan area. Transit service between the airport and the terminals is provided on 30-minute headways during 11 hours of the day. A number of innovative intra-airport circulation systems have been developed to shuttle passengers between remote parking areas and terminal buildings. The system operating in Tampa airport which is comparable to the system under development at the Seattle-Tacoma International Airport is described. A pace setter in airport development is the Houston International's underground transit system to connect the ground access parking facilities with 2 satellite terminals. The system provides service on 2-minute headways to 6 stations through the terminal area. The AIRTRANS system at Dallas/Fort Worth airport is also described.

Corradino, JC Schimpeler, CC (Schimpeler-Corradino, Associates) *Airport World* Vol. 6 N June 1973, pp 40-43

ACKNOWLEDGMENT: Federal Aviation Administration Library

#### 09 155620

##### AIRPORT LANDSIDE ANALYTIC PROGRAM DEVELOPMENT

Computer implemented analytic models have been developed which will assist in the quantitative assessment of the adequacy of the airport landside, that is, the partition of the airport property not utilized by aircraft. The primary measures of adequacy are passenger delay and passenger processing time. Detailed analytic models have been derived using queueing theory for those airport landside components which are essential to passenger processing. Also, a landside analysis program has been developed to quantify airport landside delay and capacity. The major outputs of this program are the per passenger processing times at each landside service facility, the per passenger processing times and cumulative processing times at each terminal unit and groundside area in an airport for both enplaning and deplaning passengers, and a summary of the delay and total processing times at an airport by terminal and for the entire airport. Other outputs are also generated by the program and many other items are computed externally and if desired can be output without significant program modification. This program has been applied to the existing and planned facilities at the large hub air carrier airports and a large data base has been created for a total of 25 large hub airports. The data base is constructed such that the data can be modified or additional data input in a relatively straight forward manner.

Gentry, DE Doyle, KM (Aerospace Systems, Incorporated) Odoni, AR (Massachusetts Institute of Technology) H H Aerospace Design Company, Incorporated Feb. 1977, 103 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

#### 09 155664

##### A REVIEW OF TECHNIQUES FOR ESTIMATING AIRPORT LANDSIDE CAPACITY

Methods of analyzing capacity and delay are categorized (rules of thumb, analytical models, simulation models) and discussed with special reference to the elements and sub-elements (runway, taxiway, gates, terminal, curb, roadway, parking lots) of the airport system. Simulation methods of a proprietary nature tailored to a specific airport are used on taxiway, and terminal building elements. These methods which require good data inputs and are difficult to validate, do not estimate capacity but show how facilities might operate under predicted future usage or layout changes. Airport master plans which show a phased expansion of both the landside and airside for the airport, should contain estimates of the capacity of all of the landside elements for these various phases.

Simpson, RW  
Massachusetts Institute of Technology FTL Memo 74-11, 1974, 22 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: Massachusetts Institute of Technology, Flight Transportation Laboratory, Cambridge, Massachusetts, 02139

#### 09 155888

##### FIXED 400 HZ POWER FACILITIES--FOR AIRPORTS

Economic and technological aspects of airport stationary 400 HZ power generating facilities for ground services are reviewed and composed to reliance on traditional mobile ground power units (GPU). The development of fixed HZ airport power facilities is the wish of the aerospace industry, whose ground terminal requirements (small short-length calling) contrast with those of high-power long-haul electric power transmission. New designs of generators, distribution networks, and line drop compensators are discussed. Reactance effects, of minor importance in 50/60 HZ distribution systems, loom large in the 400 HZ system, aircraft connections, power supply to airport passenger bridges, and power cost per loading gate are discussed.

Van der Horst, J (Teledyne International) *Airport Forum* Vol. 6 No. 4, Aug. 1976, pp 47-52

ACKNOWLEDGMENT: Massachusetts Institute of Technology

#### 09 158220

##### SHORT-BREAK GENERATING PLANT FOR BERLIN-TEGEL AIRPORT

The Berlin-Tegel Airport is taken as an example to describe the back-up power supply for airport lighting by use of an AEG diesel short-break generating plant. This article gives a description of the function and layout of the short-break generating plant, as well as special features of the Berlin-Tegel plant.

Jost, A *AEG/Telefunken Progress* No. 1, 1976, pp 6-10

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 09 163483

##### ACTIVATED SLUDGE TREATMENT OF AIRPORT WASTE WATER CONTAINING AIRCRAFT DE-ICING FLUIDS

The studies reported include bench-scale activated sludge studies at low wastewater temperatures to determine the optimum loading conditions for treatment of a combination of de-icing fluid and airport wastewater; pilot-scale activated sludge studies to verify the optimum organic loading and study possible operational problems; and bioassay studies to determine the acute toxicity to rainbow trout of aircraft de-icing fluids and effluents from the activated sludge system.

Jank, BE Guo, HM Cairns, VW *Water Research* Vol. 8 N No. 1, Nov. 1974, pp 875-880, 9 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 09 163489

##### AIRPORT PASSENGER VEHICLE ON TRAILS

Many of the short range, restricted speed duties carried out on airports all over the world ideally could be done by battery electric vehicle. In the Spring of 1976, Smith's Electric Vehicles, Ltd. displayed at the Fifth World Airports Exhibition in Brighton, Sussex, a passenger carrying vehicle destined later for trails at Teeside Airport, Darlington. It will be used to carry passengers between the terminal building and the railway station, a distance of about 1,100 yards within the airport site. Carrying 10-12 passengers, the maximum operating speed on the level is approximately 20 m. p. h. (32 km/h) and the operating range is between 60 and 70 miles per battery charge, which can be extended by taking advantage of any inactive period during a tour of duty to recharge from the Chloride-Legg Spegel charger. The battery is of 36 cells, 441 a/h capacity and is easily accessible through removable panels and by lifting the seats.

*Electric Vehicles for Industry* Vol. 62 No. 2, June 1976, p 22

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

#### 09 163494

##### CINCINNATI REGIONAL AIRPORT

Lighting for the Cincinnati Regional Airport features the use of 1000-watt metal halide low-brightness luminaires for the main parking area and 400-watt high-pressure sodium lamps for the roadways. In the terminals,



baggage claim buildings, and concourses a newly developed mercury lamp with good color rendering ability is used in conjunction with a Fresnel lens downlight with broad light beam distribution. To provide the required emergency lighting in these areas, some of the luminaires are equipped with an automatic relay and an auxiliary tungsten halogen lamp.

Hahn, HR (Horton (Jules G) Light Design, Incorporated) *Lighting Design and Application* Vol. 5 No. 5, May 1975, pp 20-23

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

## 09 163504

### LA GUARDIA PARKING AND TERMINAL FRONTAGE STRUCTURE

The selection of construction materials and, therefore, a structural system, hinged on the concept of exposed steel throughout the open air building. A system of braced main frames combining the benefits of plastic and composite design was chosen as the most economical framing system. Erection was aided by the use of fabricated structural "trees" for the "facade." The contract also included concrete helical ramps, elevated roadways, enclosed pedestrian bridges, and other traffic control and access facilities.

Fasullo, EJ (Port Authority of New York and New Jersey) *ASCE Civil Engineering* Vol. 63 No. 3, Mar. 1976, pp 53-56

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

## 09 163505

### HIGH MAST AREA LIGHTING AT NEWARK INTERNATIONAL AIRPORT

Description of the high mast, lowering device area lighting system for the new Newark International Airport Terminal area. Fifty 100-foot towers provide complete roadway and area lighting.

IEEE Ind Applied Soc, Annual Meeting (9th) Conference, Pittsburgh, Penn., October 7-10, 1974.

Perlstein, SL Goldberg, DL (Port Authority of New York and New Jersey)  
Institute of Electrical and Electronics Engineers Proceeding 1974, pp 165-167

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

## 09 163510

### NATIONAL CONFERENCE ON SNOW AND ICE CONTROL, 1ST, 1972

Proceedings of papers are grouped under the following headings: Today and tomorrow; the urban scene; the road and the wind; sane and sensible use of chemicals; equipment and overview; airports and winter; and operations management. Among the specific subjects treated are urban development and the requirements of snow and ice control; snow control design for highways; planning for ice control and snow clearing in urban areas; modelling techniques in snow plow research; transportation and weather; and management and control of winter operations.

Proceedings of the Conference held in Ottawa, Canada, 1973.

Thomas, MK

Roads and Transportation Association of Canada Proceeding 1973, 268 pp

ACKNOWLEDGMENT: EI

ORDER FROM: Roads and Transportation Association of Canada, 1765 St Laurent Boulevard, Ottawa, Ontario K1G 3V4, Canada

## 09 163528

### SWISS DIG DEEP FOR HIDDEN CAR PARKS

The garage at Geneva's Cointain airport in Switzerland houses 410 cars in five floors, built within a diaphragm wall. The effective volume of the underground structure totals 25,000 cu m, of which 21,600 cu m is filled by the system and 3,400 cu m by the body of the central core.

*International Construction* Vol. 13 No. 11, Nov. 1974, pp 76-79

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

## 09 163529

### SYSTEMS AND ENVIRONMENTAL EMC CONTROL PROGRAM FOR THE AIRTRANS AUTOMATED GROUND TRANSPORTATION SYSTEM

This paper describes the EMC program implemented for the AIRTRANS ground transportation system installed at the Dallas-Fort Worth Regional Airport. A review of the EMI techniques applied at the equipment level for the automatic control, propulsion control and surveillance system is provided. A presentation is made concerning derivation of the limits for radiated and conducted emissions from the vehicles; limits which can be reasonably applied to commercial systems yet provide the necessary control to insure the system is operationally compatible and free from mutual interference. The system will operate without interference to adjacent aeronautical, safety and special, and broadcast radio services. Measurement data are provided showing the radiated and conducted emission characteristics of a vehicle operating on-site. These measurements, compared against the limits established for the system, show that the required conditions of electromagnetic compatibility have been achieved.

Proceedings of a Symposium and Technical Exhibit on Electromagnetic Compatibility, Mantreux, Switz, May 1975.

Koeritz, KW Robson, CA (LTV Aerospace Corporation) *IEEE Transactions on Electromagnetic Compatibility* Proceeding 1975, pp 443-451, 9 Ref.

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

## 09 226289

### PARKING'S PLACE IN AIRPORT PLANNING

the article discusses parking requirements and criteria in the planning of airport facilities. Parking duration is relatable to requirements of the various users-employees, passengers, visitors. The ratio of short term to long term parking should be taken into account in balancing convenience against costs. New developments, such as rapid transit, must be included with air passenger volumes in projecting parking requirements. Availability, parking price structure and integration into airport passenger and baggage handling processes must also be considered.

Orman, JC *Traffic Engineering* Vol. 41 No. 5, Feb. 1971, 5 pp, 3 Fig.

ORDER FROM: ESL

## Chapter 10

# TERMINAL DESIGN AND OPERATIONS

10 073882

### IMPLICATION OF MECHANICAL SYSTEMS ON AIRPORT TERMINAL DESIGN

The prime objective of the paper is to delve into mechanical systems for people-movers, baggage-movers, cargo-movers and explore the influence which these new devices may have on the design of major airports and air terminals. Major emphasis is placed on the aspect of moving people since this is where the greatest need appears to be required. The author proposes a definition of "Unacceptable Walking Distance" since this determines the transition to mechanical devices.

Prokosch, W

Society of Automotive Engineers 700259, Apr. 1970

ACKNOWLEDGMENT: Flight Transportation Laboratory, MIT (FTL 3-3)  
ORDER FROM: Massachusetts Institute of Technology, Flight Transportation Laboratory, Cambridge, Massachusetts, 02139

10 073884

### ANALYSIS FOR THE DESIGN OF BAGGAGE HANDLING SYSTEMS AT AIRPORTS

The first purpose of this study is to examine characteristics of baggage equipment that should be considered in the planning of new systems. Operating characteristics, space requirements, flexibility, impact on passengers, and costs of present and emerging systems are compared. The second purpose compares two techniques for modeling the outbound system in terms of usefulness for planning purposes. The two techniques are monte carlo simulation (probabilistic) and deterministic queuing (non-probabilistic).

Karash, K

Massachusetts Institute of Technology R70-30, May 1970

ACKNOWLEDGMENT: Flight Transportation Laboratory, MIT (FTL 3-3)  
ORDER FROM: Massachusetts Institute of Technology, Flight Transportation Laboratory, Cambridge, Massachusetts, 02139

10 073897

### AIRPORT TERMINAL DESIGN

The purpose of this paper is a brief survey of terminal design from the people moving aspect, the baggage handling aspect, and the service providing aspect. The underlying assumption of the paper is that the building is no more than a connector between air and ground transportation systems. The report is divided into two major areas of discussion with these being broken down further into subheadings. The departure includes land transport arrival, baggage surrender, check-in, landside wait, statutory control, airside wait, and boarding the aircraft. The arrival includes, leaving the aircraft, immigration, baggage wait and claim, and land transport departure.

DiGenova, R

Massachusetts Institute of Technology SEM 11, Dec. 1970

ACKNOWLEDGMENT: Flight Transportation Laboratory, MIT (FTL 2-1)  
ORDER FROM: Massachusetts Institute of Technology, Flight Transportation Laboratory, Cambridge, Massachusetts, 02139

10 093463

### THE APRON AND TERMINAL BUILDING PLANNING MANUAL

This document presents planning recommendations for terminal building areas and apron space. The apron and terminal building areas are defined as those areas included and limited by the curb roadway and associated parking on the landside and taxiway access to the apron on the airside. The principal areas presented are: apron, connector, terminal, curb roadways and parking. Space considerations are presented as they are affected by these four principal concepts, airport traffic volumes, types, and station characteristics. A presentation of area and layout for all major elements of the terminal building is illustrated in tabular, graphic and plan formats. Sources of planning information and guidance for the procurement and input of this information are provided. Gross terminal sizing recommendations for medium and long-range planning are presented. Comparative costs for on and off airport projects are discussed.

Parsons (Ralph M) Company, Federal Aviation Administration Final Rpt.  
FAA-RD-75-191, RMP-5032-2, July 1975, 340 pp

Contract DOT-FA72WA-2950

ACKNOWLEDGMENT: NTIS

ORDER FROM: NTIS

AD-A018120/6ST

10 127692

### METHOD FOR DESIGNING AIRPORT TERMINAL CONCEPTS

Much design effort in airport planning is expended on terminal concept development. Such a method has been developed and is introduced. It considers the terminal as a system of basic facilities that house the activities and links that represent the passenger traffic flow lines. The method uses heuristic programming to achieve an optimum design. The method is composed of three interacting algorithms: (1) the facility sizing algorithm; (2) the flight assignment algorithm; and (3) the facility layout algorithm. The output consists of a strategy for flight assignment, a layout showing the configuration of gate positions at the apron level, and a plan of terminal elements at three different building levels. The output is preliminary and should be taken as a benchmark for further concept development and design. Several hypothetical design problems were tested successfully. /ASCE/

Braaksma, JP (Carleton University, Canada) Shortreed, JH (Waterloo University, Canada) *ASCE Journal of Transportation Engineering Proceedings* Vol. 101 No. TE2, ASCE #11308, May 1975, pp 321-335, 8 Fig., 1 Tab., 8 Ref., 2 App.

ORDER FROM: ESL

10 131176

### DESIGNING THE AIRPORT TERMINAL

The purpose of this paper is to provide the conceptual and analytical framework for determining the best alternatives for providing landside capacity at airports. The basic premise is that many current problems at airports are due to the unfortunate tendency of airport planners to impose a single design concept on the entire terminal area. Centralized terminals are easier for transferring passengers, gate-arrival terminals are better for short-haul commuters, transporter designs are more economical for peaks of traffic, and so on. To determine the best design, we must examine the variations in the traffic. Since the major differences among the alternative design concepts lie in their ability to handle transfers and to deal with peaks of traffic, we should concentrate on determining the percentage of transfers and the variations in the level of traffic. Based on this point of view, the paper summarizes the major distinctions in airport traffic in the United States and around the world. The paper next examines the major questions concerning the fundamental nature of the terminal facilities at an airport. Should the facilities be centralized in a single major complex or decentralized into separate terminals or gates as with the gate-arrival concept. Should transporters be used almost exclusively, partially, or not at all. To what extent should the facilities be shared by different airlines? For each question, we develop a simple analytic model to explore the principal issues and trade-offs and to indicate the general circumstances for which each of the major alternative design concepts is most appropriate. The results of these analyses generally indicate which combinations of design concepts should be chosen for airports with different mixes of traffic. The results also suggest an analytical procedure we can use to determine in detail the kind of design that is preferable for a particular site. /Author/

Proceedings of a conference held in Tampa, Florida, April 28-May 2, 1975, and sponsored by the Transportation Systems Center and Federal Aviation Administration, U.S. Department of Transportation.

De Neufville, R (Massachusetts Institute of Technology) *Transportation Research Board Special Reports* No. 159, 1975, pp 233-248, 12 Fig., 1 Tab., 24 Ref.

ORDER FROM: TRB Publications Off

10 144428

### OPTIMUM SIZING OF AIRPORT TERMINAL FACILITIES

This paper reports on the development of an algorithm for computing the minimum amount of space required for an airport terminal. Current practice of computing space requirements relies heavily on "peak-hour" forecasts. These forecasts are suspect because they fail to show the variations which occur within a peak hour, especially now with the use of wide-body jets. To overcome this deficiency an algorithm was devised which takes as input an airline schedule and produces the minimum amount of space required. Since no formal mathematical technique could be found to solve this large combinatorial problem, the algorithm was based on heuristic programming.

It allocates loads from flights to facilities in such a manner that the sum of the areas of the facilities is a minimum. /Author/

Braaksma, JP (Carlton University, Ontario) Shortreed, JH (Waterloo University, Canada) *Engineering Optimization* Vol. 2 1976, pp 97-109, 8 Fig., 5 Tab., 10 Ref.

ACKNOWLEDGMENT: TRRL (IRRD-222104)

ORDER FROM: Gordon & Breach Science Publishers Limited, 42 William IV Street, London, England

10 148872

#### ASSESSMENT OF OPERATIONAL AUTOMATED GUIDEWAY SYSTEMS- AIRTRANS (PHASE 1)

This report presents the results of an evaluation study of AIRTRANS, a unique, automated guideway system located at the Dallas/Fort Worth Airport. AIRTRANS was designed to move passengers, employees, baggage, mail, trash and supplies. The newest and largest system of its type in the world, it comprises 13 miles of single lane guideway and 68 vehicles, and serves 53 stations at different points in the airport complex. The system is one of the first intra-airport transit systems conceived, designed and constructed as an integral part of the airport development. The study, conducted with the cooperation of the Dallas/Fort Worth Regional airport and the Vought Corporation, was intended to codify the information and experience gained in the planning, development, implementation and initial operation of the system into an integrated body of knowledge from which those concerned with any phase of future, similar system planning and implementation could profit. The assessment team found AIRTRANS an impressive accomplishment. As a pioneering project, AIRTRANS did not have an extensive data base to build on, and consequently some problems arose attributable to insufficient system planning, analysis, organization and specification, as well as optimism about schedules and component reliability. Considering this, AIRTRANS is impressive and commendable but it could be more efficient and effective and is being constantly improved towards these goals. The report provides information useful to planners, designers, developers and operators of automated transit systems for intra-airport and other applications. /Author/

Kangas, R Lenard, M Marino, J Hill, JH Bowe, J Watt, C Priver, A Yen, A (Mitre Corporation) Putukian, J Wlodyka, R *Transportation Systems Center, (DOT-TSC-UMTA-76-15) Final Rpt. UMTA-MA-06-0067-76-1, 1976, 294 pp, 40 Fig., 19 Tab., 32 Ref., 4 App*

ORDER FROM: NTIS

10 152864

#### PASSENGER TERMINALS: THE NEED FOR A FLEXIBLE ARCHITECTURE TO INTERFACE WITH PRESENT AND FUTURE AIRCRAFT TYPES

The components of the aircraft/terminal interface which have caused premature obsolescence of terminal architecture are identified. The primary cause has been the inability of the facility to be easily expanded to generate additional gates, or to be modified rapidly and economically to accommodate new aircraft geometries. Optimization of space, flexibility, adaptability and expandability, all at a viable cost, are defined as the planning and performance criteria for a new terminal architecture. A research program is outlined that undertakes to explore new methods of parking an airplane to optimize ramp space, to develop a new low cost prefabricated modular architectural system which would insure terminal flexibility and reduce implementation time, and planning which would maximize the use and productivity of terminal passenger hold rooms and circulation concourses. /GMRL/

Presented at the Third Intersociety Conference on Transportation, July 14-18, 1975.

Waitzman, SV (Gersin (Robert P) Associates, Incorporated) American Society of Mechanical Engineers, Institute of Electrical and Electronics Engineers 1975, 37 pp

10 152865

#### DESIGN CONSIDERATIONS FOR PASSENGER AIR TERMINALS

Although an airport may have immense ground dimension, there is no reason why humanism cannot be encompassed in the airport terminal. It is the utilization of modular space combined with humanism that makes a large

airport possible. Dallas/Forth Worth Terminal is only one example of an evolutionary process toward designing passenger terminals that must expand and grow toward changing needs in the aviation industry. New solutions yet to come must exercise stronger discipline and greater imagination. /GMRL/

Presented at the Third Intersociety Conference on Transportation, July 14-18, 1975.

Adler, RM

American Society of Mechanical Engineers, Institute of Electrical and Electronics Engineers 1975, 5 pp

10 155457

#### AN EVALUATION OF ALTERNATIVE TERMINAL DESIGNS FOR AIRPORTS

This thesis is a study of terminal design and their impact on the service provided to the passenger. A GPSS simulation was written to evaluate terminal configuration concepts. This model was given the capability of simulating most known designs. Three designs were selected for specific evaluation in this thesis-finger pier, mobile lounge, and gate arrival types. The two basic level of service variables used were path times and walking distance.

Fay, DR

Massachusetts Institute of Technology 1971, 220 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

10 155458

#### OPTIMAL USE OF VEHICULAR SYSTEMS IN THE DESIGN OF AIRPORT TERMINALS

A cost-effectiveness analysis of airport terminal design is presented which focuses on the degree to which vehicular systems for transferring passengers to aircraft should substitute for constructed facilities. The implications of the stochastic demand for gate positions on costs and economies of scale are examined. For current costs, it is shown that the pure strategy of using vehicles is about 20 to 40% more expensive than the construction alternative. Consideration of the marginal costs of meeting peak passenger flows indicates, however, that a mixed strategy is optimal. Total costs can be reduced by about 15% by using vehicular systems to substitute for about 30% of the gate positions at a large airport. Recent experience in Europe and North America corroborates this finding.

de Neufville, R Moore, H Yaney, JC

Massachusetts Institute of Technology 1972

ACKNOWLEDGMENT: Massachusetts Institute of Technology

10 155504

#### SOME FACTS ABOUT HORIZONTAL MOVING SIDEWALKS AT AIRPORTS

Manufacturers information on the speed and capacity of horizontal moving sidewalks is presented and compared with observations at Los Angeles and San Francisco International Airports. Several definitions of capacity are considered and conclusions are drawn with respect to the observations at Los Angeles and San Francisco. Allowable speeds of ramps or walks are tabulated, and it is noted that horizontal moving sidewalks are restricted to a maximum speed of 180 ft. per minute, and that the fastest manufacturer specified speed in U.S. installations is 125 ft. per minute. User safety aspects are also discussed. It is noted that it would be more desirable to define capacity as the rate at which users can enter the moving walk and not the rate at which they exit. The majority of users arrived at the moving sidewalk entrance within 10 seconds of others. Further observations related to location of the sidewalk, and service times are also recorded.

From the Transportation Facilities Workshop: Passengers, Freight and Parking.

Horonjeff, R (California University, Berkeley) Hoch, CJ

American Society of Civil Engineers Proceeding 1975, pp 323-334, 3 Fig., 5 Tab.

ACKNOWLEDGMENT: Massachusetts Institute of Technology



## 10 155510

**AIRPORT TRANSIT SYSTEMS--A MAJOR FACTOR IN TERMINAL EXPANSION**

This review of systems which facilitate the passenger by reducing walking distances and related time to an acceptable minimum, describes horizontal or angled people-movers, elevated or underground automated transit car systems, and various bus type vehicles including those with an elevating system. An inclined passenger conveyor installed at Charles de Gaulle Airport in Paris, an S-Type Speedway which consists of a continuous surface of metal platforms, and systems incorporating an acceleration technique (parallel belts, rotating disc, overlapping combplates, trellis) are described. Terminal concepts which despite expansion can maintain their efficiency and passenger acceptability by incorporating transit systems include the following: central terminal with piers; central terminal with satellites; linear terminal concept; unit terminal; transport concept. It is shown how the capacity of these concepts can be extended by the use of people moving systems.

*Airports International* No. 50, Aug. 1975

ACKNOWLEDGMENT: Massachusetts Institute of Technology

## 10 155537

**MOBILE LOUNGE DESIGN WITH CHECK-IN, PASSPORT CONTROL AND BAGGAGE-HOLD FACILITIES**

This report describes the design, criteria, requirements and structure, of a new mobile lounge concept which incorporates check-in, baggage hold, immigration and passport control, facilities in the vehicle. The mobile lounge is designed to plug into, and expand, terminal building facilities during passenger peak periods.

Bennetts, D Hawkins, NM McGinity, PD O'Leary, M Ashford, N  
Loughborough University of Technology, England TT 7512, Aug. 1975, 29 pp

ACKNOWLEDGMENT: Port Authority of New York and New Jersey

## 10 155539

**A COMPUTERIZED DESIGN METHOD FOR PRELIMINARY AIRPORT TERMINAL SPACE PLANNING**

The purpose of the research was to develop a design method to aid the master planning process of the airport passenger terminal system. Design, in the context of this research, involved taking as inputs the various aviation forecasts and synthesizing terminal space plans. That is, produce in an objective manner programs of space utilization and layout characterized by: (a) the size and shape of major terminal components, (b) the assignment of flights to these components, and (c) the relative location of these components. Space plans form the basis for terminal concept development which is part of master planning. A design methodology, based on the heuristic modelling technique was developed. It was computerized for automated design. The methodology is composed of three major algorithms; the Facility Sizing Algorithm, the Load Assignment Algorithm, and the Facility Layout Algorithm. The end product is a program of load assignments and a geometric configuration consisting of an apron level and three terminal building levels. A hypothetical terminal was designed by this method and the results are encouraging. The methodology has potential for designing good functional space plans.

Braaksma, JP  
Waterloo University, Canada 1973, 254 pp

ACKNOWLEDGMENT: Port Authority of New York and New Jersey

## 10 155562

**THE DESIGN OF THE PASSENGER PROCESSING SYSTEM FOR AIRPORT TERMINALS**

This report describes the first stage of a three year research program concerned with the development of a design methodology for the planning of the passenger processing facilities in airport terminals. The research program is an integral part of a larger project investigating various aspects of the airport system. The first stage of the program is concerned with the development of a conceptual model of the terminal design process. This development encompasses a review of current planning practice and a consideration of some recent innovations in planning and design methodology.

108

Bennetts, D Hawkins, NM McGinity, PD O'Leary, M Ashford, N  
Loughborough University of Technology, England TT7407, Aug. 1974, 89 pp

ACKNOWLEDGMENT: Port Authority of New York and New Jersey

## 10 155570

**DESIGN PRINCIPLES FOR DECENTRALIZED TERMINALS**

The development of readily manageable design methods for the facilities used to handle passenger traffic between the curbside and the aircraft, so that all these facilities can be matched to one another's efficiency, was the object of a study whose main results are summarized below. The article also furnishes architects with functional and design principles for use as instruments in arriving at convincing layouts. The considerations underlying the remarks presented here produced good results when applied to the planning of Hannover's new terminal.

Piper, HP *Airport Forum* Vol. 4 No. 3, Oct. 1974, pp 38-39

ACKNOWLEDGMENT: Federal Aviation Administration Library

## 10 155571

**THE PASSENGER TERMINAL--A SYSTEMS ANALYSIS APPROACH**

The writers have examined the "passenger handling facility" as a link between air and surface transport. With the aid of a simulation model and empirically based passenger behaviour patterns they have arrived at certain important design data. In practice, the method described here could be used in calculating the approximate size required for surface transport facilities and checking the capacity of existing or planned facilities.

Baron, P (Dortmund University) Henning, D *Airport Forum* Vol. 4 No. 2, June 1974, pp 69-82

ACKNOWLEDGMENT: Federal Aviation Administration Library

## 10 155578

**THE DISMANTLED AIRPORT (USE OF MOBILE LOUNGES)**

This article suggests that airports should be regarded as freight airports and that passengers should be transported from the passenger terminal to the freight airport by vehicles. These vehicles are then raised to the doors by specially designed lift devices so that passengers can enter and leave the aircraft via an airbridge. These vehicles would reduce the burden on private and taxi traffic as well as congestion on the road. It is suggested that older airports (without airbridges) should be equipped with fixed or mobile lift devices to raise the buses up to the aircraft. New airports, however, could have the freight area with fixed freight handling and servicing facilities beside the terminal, and links could be provided by roller tracks and conveyor chains. New airports could also have freight areas with mobile or fixed loaders at the aircraft positions.

Bosse, CB *Airport Forum* Vol. 5 No. 2, Apr. 1975, pp 4-5

ACKNOWLEDGMENT: Federal Aviation Administration Library

## 10 155579

**NEW COMMUNICATIONS IDEAS EXPEDITE PEOPLE MOVING**

This article describes the installation of a Centrex Telephone system at Seattle's Sea-Tac International Airport, and the new ultra high-speed passenger information boards going into the new terminals at Newark International Airport. Seattle's Centrex system is backed by the latest electronic switching technology (the equipment is installed in a central office). Called ATS (Airport Telecommunications system), the new setup can provide on a single line, the same functions that formerly required a number of different services. The airport's tenants report a number of operations benefits. Not only has ATS improved operations but has also reduced costs for overall telephone services. Newark's "Real-Time" passenger information board consists of an electronic flap display system that causes all boards to act like a normal video character generator. The format of the character generator on the large board displays is composed of alphanumeric or wide flap modules; changes in characters are accomplished by the adaptation of the pulse code modulation (PCM) integrated logic circuits for both transmitter and the receivers used throughout the system.

*Airport Services Management* Vol. 15 No. 12, Dec. 1974, pp 28-30

ACKNOWLEDGMENT: Federal Aviation Administration Library

10 155580

#### BAGGAGE--THERE'S NO PAT ANSWER

The need is pointed out for a careful consideration of the specific baggage problem and for a systematic search for the most cost-effective solution. Overall performance goals which should be achieved are listed, as well as the special needs for handling bags from arriving aircraft. Three of five goals for the system to handle outgoing baggage deal with check-in position locations. A system to process baggage through a domestic terminal is also considered. Airport management, working with the airline tenants must make some policy decisions before implementation of a baggage handling plan. These policy decisions relate to the check-in location, and to the gate layout. The importance is also noted of making equipment selections and the manpower needed to operate and maintain the equipment. The possibilities of future growth must also be considered in baggage handling plans.

Mason, JG *Airport Services Management* Vol. 16A No. 3, Apr. 1976, pp 40-41

ACKNOWLEDGMENT: Federal Aviation Administration Library

10 155584

#### TERMINAL DESIGN IS COMING OF AGE

Past developments and constraints which have determined terminal design concepts up to current times are discussed, and insights and pressures that will determine developments in the future are noted. The simpler buildings of the future will be strong, lightweight, and easily maintained. Non combustible steel which could be made flame-retardant and is easily maintained will be a popular construction material. Modular buildings with minimal foundation, and capable of quick, economic expansion and contraction will become popular. Future terminal design will make more intensive use of the land, and more efficient use of the contained space. Design criteria for future terminals will include: easy junction of passenger and airplane; ample curbspace for loading and unloading passengers; elimination of the need to cross active roadways; abundant and secure parking; built-in, convenient cargo handling facilities; and minimal life-spans consistent with economic payout.

Christian, RW *Airport Services Management* Vol. 13 No. 3, Mar. 1972, pp 26-28

ACKNOWLEDGMENT: Federal Aviation Administration Library

10 155590

#### NEW IDEAS IN CARGO AND BAGGAGE HANDLING

A new design is described for an automatic sortation subsystem (installed at Dallas/Fort Worth Airport) in which packages are carried in V-shaped trays split down the middle so that one wing operates independently of the other. The system handles packages of any size and shape up to 100 pounds at a rate of 40 articles per minute. A vertical conveyor is also described which will transport (up or down) a wide mixture of items and packaging configurations. The system which requires only 6 ft. x 4 ft. floor space, has a lift which operates at a constant speed of 90 fpm and has a maximum drive requirement of 3.5 h.p.

*Airport Services Management* Vol. 16 No. 11, Nov. 1975, p 17

ACKNOWLEDGMENT: Federal Aviation Administration Library

10 155592

#### HOW THE AIRLINES FEEL ABOUT PRESENT BAGGAGE SYSTEMS

This paper presents responses to a special industry survey, in which airlines were asked to report which types of inbound and outbound baggage systems they are using and what they think about the needs to develop improvements.

*Air Transport World* Vol. 12 No. 2, Feb. 1975, pp 38-41

ACKNOWLEDGMENT: Federal Aviation Administration Library

10 155604

#### ARCHITECTS' IDEAS FOR AIRPORT DESIGN

The importance is noted of flexibility which is one of the most common concepts among airport architects. The reasons for its importance are: air

transportation accommodation needs keep changing to the point of being difficult to anticipate; the mix of transportation at the airline terminal interface is becoming more complex. Problems related to intermodality are discussed as well as other transportation requirements at the terminal such as room for automobiles, buses, etc. Comments are made on the need for intra-terminal transportation, and on the economics of the intermodal terminal.

*Airport Services Management* Vol. 14 No. 1, Jan. 1973, pp 26-30

ACKNOWLEDGMENT: Federal Aviation Administration Library

10 155622

#### OUTBOUND AIRLINE BAGGAGE SYSTEMS-A SURVEY OF TECHNOLOGIES AND EVALUATION OF METHODS OF ANALYSIS

This thesis is a study of baggage handling technology and of models for analysis of outbound baggage systems. Baggage handling technologies are examined for their impact on passengers, space requirements, operating capacity, and cost. A GPSS simulation model and a deterministic queueing model are evaluated as planning tools for future baggage systems. A diffusion approximation is used to improve the deterministic estimates of queue length at check-in counters. Both models appear to be useful as planning tools although both overestimate queues in some situations. The GPSS model gives more detail on the baggage system simulated; however, the more simple and less costly deterministic model appears to be as useful as the GPSS model for determining staffing requirements.

Karash, KH  
Massachusetts Institute of Technology 1970

ACKNOWLEDGMENT: Massachusetts Institute of Technology

10 155625

#### A COMPUTER SIMULATION OF TAMPA INTERNATIONAL AIRPORTS LANDSIDE TERMINAL AND SHUTTLES

TOPSIM, a terminal simulation package developed at MIT, was used to simulate Tampa's landside terminal and to study its capacity-congestion characteristics as traffic levels increase. TOPSIM indicates that congestion arises at the ticket counters and on the critical segments of the elevator cycle when annual traffic volumes reach over 14 million passengers. TOPSIM's modular design has sufficient flexibility to handle a variety of airport layouts without major reprogramming effort. The package was previously used to simulate passenger flows for hypothetical "Metropolitan" terminals (handling passenger volumes, similar to LaGuardia) and for Eastern Airlines terminal at Logan. It produces performance statistics on passenger movements (such as total distance walked and time spent standing in queues) and on facilities (such as utilization of ticket booths). TOPSIM's application to Tampa demonstrates its ability to handle other than "shuttle" oriented terminals. In fact, it can theoretically simulate any terminal regardless of trip type or mode, since the passenger processing routine is similar for most terminals.

Blumer, TP Simpson, RW Wiley, JR  
Massachusetts Institute of Technology FTC Report 76-5, Apr. 1976

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: Massachusetts Institute of Technology, Flight Transportation Laboratory, Cambridge, Massachusetts, 02139

10 155634

#### SIMULATING PASSENGER ARRIVALS AT AIRPORTS

A simulation model of arriving passenger processing systems at an airport predicts the levels of flow, delay, and facility utilization based on traffic projections, physical plans, and operational procedures. The model can be used to evaluate planning and operating alternatives at terminals.

Nanda, R (New York University, New York) Browne, JJ Lui, R  
(Port Authority of New York and New Jersey) *Industrial Engineering* Vol. 4 No. 3, Mar. 1972, pp 12-19, 6 Fig., 4 Tab., 6 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

10 155637

**ANALYTICAL MODELS FOR THE DESIGN OF AIRCRAFT TERMINAL BUILDINGS**

Queueing models appropriate for estimating passenger delays in airport terminal buildings are presented. The models for enplaning provide steady state results while the flow of deplaning passengers is assumed to be time dependent. The Terminal is divided into components each of which is studied through an appropriate queueing model. One results computed for each component are combined to provide an over all picture of the delays and the level of service in general, as well as the space and manpower requirements in the terminal building. The computational effect is minimal and very inexpensive. Computer work is only necessary for the computation of the queueing statistics in the baggage claim area. Computerization of the over all procedure though is desirable since it will greatly improve the computational efficiency. The models are tested through an example. The results show that the models can be and successfully to provide first estimates of the level of service and the physical facilities required in the terminal. Potential applications and areas of future research are also discussed.

Parasas, JD

Massachusetts Institute of Technology Jan. 1977, 135 pp

ACKNOWLEDGMENT: Massachusetts Institute of Technology

10 155641

**MAXIMUM INVENTORIES IN BAGGAGE CLAIM: A DOUBLE ENDED QUEUEING SYSTEM**

A mathematical model based on uniform arrival rates for passengers and baggage is described and formulas are obtained for computing maximum expected queue lengths of both passengers and baggage for any number of passengers and bags per passenger. The flexibility of the model, its uses, and possible extensions are discussed.

Browne, JJ Kelly, JJ le Bourgeois, P (Port Authority of New York and New Jersey) *Transportation Science* Vol. 4 No. 1, Feb. 1970

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

10 155647

**BENDIX' AUTOMATED BAGGAGE CONTROL**

A new, automated baggage control system at Eastern Air Lines' new terminal at Miami International Airport will hopefully cut costs and reduce mistakes.

*Airport World* Vol. 7 No. 3, Mar. 1974, p 27

ACKNOWLEDGMENT: Federal Aviation Administration Library

10 155652

**BAGGAGE HANDLING**

The evolution of baggage handling methods and equipment is discussed, and representative handling equipment, currently in use is classified, and its technical characteristics are outlined, and evaluated. A methodology for selecting a baggage handling system is presented and examples of applications to various airport concepts and classifications are described. Based upon the general conclusion of the study that improvements are needed in the present methods of baggage handling throughout the transportation industry, recommendations are included toward this end. The general recommendation is that a common baggage handling system for high-density airports be designed, installed at a government-selected airport, and tested and evaluated. Specific conclusions concerning optimum baggage systems for three levels of airport volume are presented.

Parsons (Ralph M) Company Apr. 1971, 166 pp

Contract DOT-OS-00062-B

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: NTIS

PB-199787

10 155683

**RESEARCH NEEDS FOR AIRPORT TERMINAL PLANNING**

This paper is a report on the desirable research directions for airport terminal systems. A consensus was reached that the problems of airport terminal

planning, design, and operation have to be extensively rethought. The research needs for this area are now principally in the "soft" side of engineering. Specific areas of particular importance concern: the nature of the airport systems and the networks that connect them; the size and distribution of the demands placed on the system; the spatial configuration of airport terminals; means to reduce labor intensity of ground side operations; the development of standards for equipment and operating procedures; the use of pricing policies to influence loads on the system; and the issues of how alternative plans should be evaluated. It is emphasized that an effective research strategy will have to corridor the institutional problems of implementation as thoroughly as the technical issues.

*ASCE Journal of Transportation Engineering* Proceeding Vol. 99 No. TE4, SAE 1015, Nov. 1973, pp 863-871, 12 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

10 155684

**AIR PASSENGER HANDLING FACILITIES: FUTURE PLANNING--DESIGN IMPACTS**

The Committee on Terminal Facilities of the Air Transport Division developed material which had as its primary objective the identification, organization, and documentation of the diversified range of future impact factors which demand flexibility in the programming, planning, and design of air passenger handling facilities. Basic categories of these impact factors include: technological developments, socio-economic developments, and institutional/regulatory developments. The documentation includes correlations of probable future events in these major categories with various impact characteristics such as generators, recipients, moderators, relevance/significance, passenger terminal components as well as probability and timing of event occurrence. The resultant series of matrices will serve as a systematic guide for airport planners, engineers, and architects participating in the development and evaluation of concepts and detailed plans by expansion or remodeling of existing passenger handling facilities as well as designing new terminal facilities on a variety of airports.

Kivett, HA *ASCE Journal of Transportation Engineering* Proceeding Vol. 102 No. TE3, SAE 12289, Aug. 1976, pp 461-474, 5 Fig.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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10 155701

**QUEUEING AT AIRPORT DESKS**

Nobody likes standing in a queue. The longer the queues at an airport, the lower in general must be the ruling given to the quality of service. A computer method for determining the right number of desks at an airport is described. The new method steers a middle course between the present very simple planning method and a complex terminal simulation.

Lewin, D (Peat, Marwick, Mitchell and Company) *Airport Forum* Vol. 6 No. 5, Oct. 1976, pp 35-44, 8 Fig., 2 Tab.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

10 155703

**STOCKHOLM'S NEW GATEWAY TO THE WORLD**

The International Terminal at the Swedish capital is described here by its architect. Although the terminal appears, at cursory glance, to be of fairly conservative design, it incorporates many features of up-to-date airport technology.

John, JI *Airport Forum* Vol. 6 No. 6, Dec. 1976

ACKNOWLEDGMENT: Massachusetts Institute of Technology

10 155706

**TERMINAL B AT ZURICH**

Zurich's Terminal B was opened on November 1, 1975, thus doubling the airport's capacity to 12 million passengers a year. This article describes the building, with particular emphasis on the design and architectural features.

Nanni, H Pestalozzi, G (Air Transport Office, Zurich) *Airport Forum* Vol. 6 No. 1, Feb. 1976, pp 17-31, 3 Fig., 11 Phot.

ACKNOWLEDGMENT: Massachusetts Institute of Technology



10 155748

**PASSENGER BUILDING**

After an era of expansion, current economic restraints have caused airport planners to concentrate on flexibility and economics in the design of passenger terminals and to arrive, by synthesizing the incompatible requirements laid down by state authorities, at solutions that are flexible enough to take considerable stretching and alteration before the need to rebuild. Examples of how basic requirements can be met are demonstrated by a discussion of the passenger terminals and the Dallas/Fort Worth Airport, the Kansas City Airport, the Toronto Mirabel Airport, the Charles de Gaulle Airport, Paris and the

From The Challenging Future. Proceedings of the 5th World Airports Conference, Brighton, England, 5-7 May 1976.

Mayes, BJ (Gollins Melvin Ward Partnership)  
Institution of Civil Engineers Proceeding 1976, 13 pp

**ACKNOWLEDGMENT:**

ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A76-46541

10 155749

**PROBLEM DEFINITION IN PASSENGERS AIR TERMINAL DESIGN AND PLANNING**

A problem definition process is discussed which consists of initially identifying as many constraints and variables as possible in close working relationships with representatives in the broad range of influences (the community, the airlines, the airport manager, the airport commission, and government regulatory agencies) which impact on the design and planning of passenger terminal facilities. The second step is to develop an incremental decision making process from this initial definition, which consists of enumerating the concerns of each of the participants, striking a logical balance between the several influences and reducing the variables to a manageable few. The variables are further evaluated until the most appropriate solution to the problem at hand is found. This process is applied to the master plan for the Singapore International Airport.

Prepared by the Intersociety Committee on Transportation.

Gale, DB (Hellmuth, Obata and Kassabaum, Incorporated)  
American Society of Mechanical Engineers ASME 75-ICI-5, July 1975, 5 pp

**ACKNOWLEDGMENT:** International Aerospace Abstracts

ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

76A-44174

10 155757

**ASTROGLIDE-THE ADVANCED AUTOMATIC GUIDEWAY TRANSITE SYSTEM**

The technical and economic aspects of a people-moving overhead monorail system powered by linear induction motors or advanced transverse flux motors, of the type used at Braniff International, Dallas to move airline passengers between the terminal and the parking area, are discussed. The advantages such a transportation system would offer to people using mass transit systems are noted. A demand-responsive fully automatic transportation system, called astroglide, is described and is shown to be far superior to the monorail installation used at Braniff International.

From Hovering Craft, Hydrofoil and Advanced Transit Systems. Proceedings of the 2nd International Conference, Amsterdam, Netherlands.

Scelzo, GP (PRT Systems Corporation)  
Kalerghi Publications Proceeding 1976, pp 29-35

**ACKNOWLEDGMENT:** International Aerospace Abstracts

ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A77-17030

10 155807

**AMSTERDAM'S GATEWAY TO EUROPE ENLARGED**

Extensions of the facilities of the Amsterdam airport are related to an enlargement of the central terminal building and a new finger which can accommodate eight B-747's simultaneously. The handling capacity of the overall complex is now 18 million passengers a year. Attention is given to

the design concept, departures, arrivals, baggage, domestic passengers, transit passengers, visitors, a sail link to the airport, aspects of car parking, the terminal building, architectural features, the air conditioning and ventilation system, the electrical system, and questions of acoustics.

Scherpbier, LW *Airport Forum* Vol. 5 No. 5, Sept. 1975, 3 pp

ACKNOWLEDGMENT: MIT Barker Engineering Library

10 155811

**PROFESSIONAL GROUND HANDLING**

Ground handling problem areas, and proposed and implemented solutions to them are discussed. Equipment design and maintenance, driver training, safety procedures, supervision of mishaps, feedback, and the "people problem" are the principle areas covered. Certain safety features on equipment already in use are described, including domestic and international catering units, a mobile scissor conveyor, scissor lifts, tugs, luggage trolleys, motorized passenger stairs, and forklifts. The aim of this article is to reduce aircraft ground damage, which is more of a problem than commonly realized.

Lovell, A (tt Airlines)  
Flight Safety Foundation, Incorporated 1974, pp 105-114

**ACKNOWLEDGMENT:** International Aerospace Abstracts

ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A75-37491

10 155836

**SURVEY ANALYSIS OF AIRPORT TERMINAL PASSENGER PROCESSING--TERMINAL PLANNING AND PASSENGER BEHAVIOR**

A survey of the passenger processing system at Manchester International Airport is described in order to demonstrate the relevance to terminal planning and design of obtaining information on passenger behavior. The survey examined the way in which passengers organize their time in the terminal in terms of both processing, circulation, and waiting times. The examination of passenger behavior in terminals has highlighted three main areas of concern for future research: namely, passenger attitudes, ancillary facilities, and access to the terminal.

Bennetts, D Hawkins, NM McGinity, PD O'Leary, M Ashford, N  
Loughborough University of Technology, England 1975, 49 pp

**ACKNOWLEDGMENT:** International Aerospace Abstracts

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10 155837

**STOCHASTIC MODELING OF AIRPORT PROCESSING--REGIONAL AIRPORT PASSENGER PROCESSING**

The construction and validation of a mathematical airport model which can be used as a homework for the analysis of the processing activities of a regional airport in an aggregate manner was described. The model tends to be statistical because of the nature of processing at airport terminals. For design purposes, the models are tailored to fit into an interactive design process for airport terminals. Three main techniques are considered: analytical queueing theory, deterministic queueing theory and simulation. A limited set of queueing models of airport processing, both landside and airside activities, was developed. Empirical information obtained from airport surveys was used to validate the proposed model of passenger processing.

Bennetts, D Hawkins, NM O'Leary, M McGinity, PD Ashford, N  
Loughborough University of Technology, England July 1975, 214 pp

**ACKNOWLEDGMENT:** National Aeronautics and Space Administration

ORDER FROM: NTIS

10 155841

**COMMAND AND CONTROL SUBSYSTEMS FOR THE FAIRLANE AND BRADLEY PEOPLE MOVER SYSTEMS**

The Fairlane Town Center (in Dearborn, Mich.) and Bradley Airport (in Hartford, Conn.) Automatically Controlled Transportation (ACT) people

mover systems both consist of a single lane of guideway between two end stations with a dual lane bypass near the center of the system. Vehicles are dispatched simultaneously from each of the end stations and pass one another in the dual lane bypass at the system center. The command and control subsystems which operate these people mover systems are described in detail. Major components include the central control console; the wayside rack with several program and logic subassemblies; and the On Board Controller. Details are also given regarding the voice communication system, the closed circuit TV system and the reliability and maintainability of the system.

Proceedings of the 4th Annual Intersociety Conference on Transportation, Los Angeles, California.

Esmer, GP Moss, WD (Ford Motor Company)  
American Society of Mechanical Engineers Proceeding 1976, 10 pp

ACKNOWLEDGMENT: International Aerospace Abstracts  
ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A77-29476

#### 10 155845

##### FORGOTTEN AIRPORT AESTHETICS

Terminal facilities in airports around the world are critically reviewed from an architectural viewpoint that considers aesthetics as well as fundamental aspects. Examples of poor terminal planning are confronted with more successful structures, considering demands placed on passenger comfort by long and tedious access routes, general appearance of corridors, maintenance of surrounding grounds, and a pleasing design of buildings and towers.

Klatt, K *Airport Forum* Vol. 3 No. 4, Dec. 1973, p 52, 1 Fig., 8 Phot.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

#### 10 155847

##### MOBILE LOUNGE OR FIXED GATE

An analysis is conducted of the relative advantages and drawbacks in the case of the fixed gate and the mobile lounge concept. The functional characteristics of the two concepts are examined. It is pointed out that the reduction in walking distances possible by the employment of the mobile lounge could also be achieved by a new terminal design. Economic aspects are also discussed, giving attention to investment planning, personnel requirements, and operating costs.

Kuckuck, HH (Lufthansa) *Airport Forum* Vol. 5 No. 1, Feb. 1975, pp 27-54

ACKNOWLEDGMENT: Massachusetts Institute of Technology

#### 10 155850

##### MUNICH II--NO ALCHEMISTIC FORMULA

The H-concept design proposal for the new Munich Riem Airport (Munich II) is described. This configuration features decentralized check-in with "Activity Nodes," one-level processing, linkage with the Munich rapid transit system and an international transport system of its own, linear terminal buildings, and an expandable passenger handling capacity. It is emphasized that this concept was arrived at by careful step-by-step group planning.

Steffen, M *Airport Forum* Vol. 5 No. 2, Apr. 1975, p 23, 5 Fig.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

#### 10 155853

##### ONE AUTOWALK--TWO DIRECTIONS, NEW MEANS OF TRANSPORT AT FRANKFURT AIRPORT

Electrical controls and mechanical equipment for a moving walkway, or autowalk, facilitating horizontal movement of passengers over extended distances in the airport terminal area at Frankfurt are described. The endless conveyor turns at the ends of the travel, and continues motion in the opposite direction. Three autowalk variants are available: a convex/concave semicircular pallet arrangement, a single-chain variant, and a two-chain variant. The two chains are independently tensioned and driven by spring-loaded sprockets. Dimensioning of the moving and stationary parts, turning arcs, and safety devices are described.

Huesler, H *Airport Forum* Vol. 7 No. 2, Apr. 1977, p 66

ACKNOWLEDGMENT: Massachusetts Institute of Technology

#### 10 155882

##### THE USE OF ANALYTICAL AND SIMULATION MODELS IN AIR TERMINAL PLANNING AND DESIGN

Complex situations at airport terminals have been successfully analyzed by operations research techniques. Using analytical and simulation models, the impact of aircraft, passenger, baggage and cargo flow rates on facilities can be quantified, thus helping to determine requirements accurately. A description of these models and their application is presented.

From Modeling and Simulation, Volum 5, Proceedings of the 5th Annual Conference, Pittsburgh, Penn., 1974.

Klingen, LG (Eastern Airlines Incorporated)

Instrument Society of America Proceeding 1974, pp 807-812, 6 Ref.

ACKNOWLEDGMENT: International Aerospace Abstracts

#### 10 155887

##### ANALYSIS OF SATELLITE AIR TERMINAL SYSTEM

The concept of satellite air terminals for large metropolitan areas is analyzed. A mixed-integer formulation of satellite-airport and satellite collection part models is used to analyze the different tangible and intangible factors involved in locating satellite air terminal facilities. The models are computationally tractable and are solvable with the aid of some of the existing algorithms. An optimal system of satellite airports and collection parts can be computed by using such models.

Sud, IK (International Bank for Reconstruction & Development) Gray, P (University of Southern California) *ASCE Journal of Transportation Engineering* Vol. 99 No. TE4, Nov. 1973, pp 935-953

ACKNOWLEDGMENT: ASCE Journal of Transportation Engineering  
ORDER FROM: ESL

#### 10 155909

##### AIRPORT TERMINAL PLANNING

Using the Dallas/Forth Worth Airport as an example, it is necessary to point out that airport terminal planning must be done with a broad view of the future and an understanding of the problems of the past. A general criterion concerning expansibility and automation with passenger convenience as a goal is presented. An airport transit system is also described, pointing out the fact that distances between terminals must be traversable in a minimum of time. Moving passengers from their deplaning gate to another terminal or to a remote parking area is a prime consideration. This same transit system is used to move employees, baggage, mail and rubbish throughout its entire circulatory system, thus completely automating the airport. A future convenience for travellers of all kinds could be an inter-city transit system tied in with the airport transit system.

From Airports for the 89's. Proceedings of the 4th World Airport Conference, London, England 3-5 April 1973.

Sullivan, TM

Institution of Civil Engineers Proceeding 1973, pp 79-84

ACKNOWLEDGMENT: International Aerospace Abstracts

#### 10 155916

##### THE TAMPA AND SEATTLE-TACOMA AIRPORT TRANSIT SYSTEMS

The Tampa and Seattle-Tacoma International Transit Systems have been in service long enough to judge the validity of their concepts and the success of their designs. These two systems have been accepted by the authorities that own and operate them. They have excellent safety and performance records. The public accepts their driverless cars routinely. The two systems are described and compared. They are similar in many respects but differ in their basic application to the airports, one being a shuttle and the other a loop system. As a result of their specific application, the automatic control systems differ. Operating and performance summaries are given. Both systems provide the same level of service and both have an availability over 99%.

Gillespie, PR (Western Electric Company, Incorporated)

Society of Automotive Engineers SAE 750624, June 1975, 27 pp, 10 Ref.

ACKNOWLEDGMENT: International Aerospace Abstracts

ORDER FROM: American Inst of Aero & Astro Tech Info Service, 750 Third Avenue, New York, New York, 10017

A75-40528

10 155918

**BAGGAGE AND CONTAINERS MEET AUTOMATICALLY (NEW CONVEYOR TECHNIQUES IN ZURICH TERMINAL B)**

A new concept in baggage handling is described. The containers which are emptied of baggage are placed in position to take baggage for loading so that no time is lost in pulling containers to loading zones. The sorting is automated.

Hilscher, G. *Airport Forum* Vol. 5 No. 3, July 1975, 1 Fig., 4 Phot.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

10 155919

**COST-BENEFIT ANALYSIS IN TERMINAL PLANNING**

Design interior for terminals on airports are analyzed. A new approach in the planning of passenger terminals as a compromise between convenience, efficiency, and costs is discussed.

Wolf, P (Technical University of Aachen, West Germany) *Airport Forum* Vol. 5 No. 3, July 1975, p 53, 4 Fig., 13 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology

10 155924

**AIR TERMINAL PLANNING--AN AIRLINE INDUSTRY VIEW**

The paper focuses on terminal planning background, conceptual considerations and design parameters, and planning participant coordination. Its principal focus is on air carrier industry forecasts and airline airport organizational coordination in air terminal planning.

From Passengers, Freight and Parking, Transportation Facilities Workshop Proceedings.

Agee, PH (Air Transport Association of America)  
American Society of Civil Engineers Proceeding 1975, pp 335-357, 13 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
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10 155925

**AIR PASSENGER TERMINAL PLANNING AND DESIGN**

The primary function of a terminal is the transfer of passengers and their baggage between aircraft and ground transportation. Methods for planning and design of such terminals are discussed in this paper. Studies are now being made in Canada and elsewhere, considering airport access and passenger procedures as an integrated sequence of events from the home or office to the aircraft for departing and vice versa for arriving. Such considerations introduce the possibilities of off-site terminals or "in-city terminals", at which some passenger procedures could be conducted, with transit systems then accessing the terminal at the airport and the aircraft. Off-site terminals integrated with transit systems are also discussed.

From Passengers, Freight and Parking, Transportation Facilities workshop Proceedings.

Beinhaker, P (Peat, Marwick and Partners)  
American Society of Civil Engineers Proceeding 1975, pp 284-307

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

10 155927

**SEA-TAC INTERNATIONAL AIRPORT: SITE CONSTRAINTS DETERMINE TRANSIT SYSTEM AND STATION DESIGN**

An airport is a system of elements all interacting on one another at various levels. It is not a service of discrete elements assembled on one site. The terminal design evolves from an analysis of the many aspects of passenger demand, site conditions, parking conditions, airline and other operational requirements, etc., and recognition of the extent to which these forces interact. This paper discusses the site constraints and physical requirements of the transit system as they interacted with the other airport requirements in the shaping of the design of the terminal area facilities and in the process shaped the transit system and station themselves.

From Passengers, Freight and Parking, Transportation Facilities Workshop Proceedings.

McCagg, EK (Richardson Associates)  
American Society of Civil Engineers Proceeding 1975, pp 308-322

ACKNOWLEDGMENT: Massachusetts Institute of Technology  
ORDER FROM: ESL

10 158218

**ELECTRICAL AND ELECTRONIC EQUIPMENT OF THE BAGGAGE HANDLING INSTALLATION AT FRANKFURT (MAIN) AIRPORT**

The complex baggage handling installation is provided with extensive electrical and electronic equipment. This covers the sectors of drive control, automation and monitoring. The construction of the systems needed for the control and automation processes demanded an exceptionally large number of components, so that the problem of reliability became very acute. To ensure virtually failure-free operation, particular attention was paid, apart from the use of redundancy techniques for important sectors, to operation monitoring and repair. Operating results so far fully meet the planned targets.

Lott, HG *AEG[Telefunken Progress* No. 1, 1976, pp 1-4

ACKNOWLEDGMENT: EI  
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10 158219

**IMPORTANCE OF BAGGAGE HANDLING AT A LARGE AIRPORT**

An airport offers the airlines both technical clearance facilities and traffic clearance systems. Within the traffic clearance system, baggage transfer must be accomplished particularly speedily and must be given high priority. The quality of the baggage transfer system is therefore a measure of the quality of the traffic clearance facilities as a whole. The transfer time of 45 minutes and an average failure rate of 0.02% achieved with its baggage handling plant place the Frankfurt/Main Airport in a leading position as a transfer airport.

Brendlin, K (Flughafen Company, West Germany) *AEG[Telefunken Progress* No. 1, 1976, pp 4-5

ACKNOWLEDGMENT: EI  
ORDER FROM: ESL

10 159711

**PASSENGER BEHAVIOR AND DESIGN OF AIRPORT TERMINALS**

The main deficiency in current terminal design methodology relates to the lack of empirically based information regarding passenger behavior and passenger requirements in airport terminals. This is exacerbated by the fact that airport planners do not have an adequate model of passenger behavior. This paper describes a research program that has attempted to alleviate these problems. The basis of the research has been the development of a design procedure and rationale capable of explicitly catering to the requirements of all terminal users. This approach will enable the airport planner to define levels of service to suit both the extent of passenger flow and the operational characteristics of the terminal. The central theme of the design methodology was the development of a set of linked analytical queuing models that can act as a framework for interpreting the processing activities of terminal users. This approach was complemented by an extensive survey of passenger behavior at an airport terminal. The survey was designed to both validate the modeling approach and test some general hypotheses about how various passenger groups spend their time in airport terminals. The latter aspect is dealt with in a discussion of some of the design implications of observed passenger behavior. /Author/

This article appeared in TRB Record 588, Airport and Air Transport Planning.

Ashford, N Hawkins, NM O'Leary, M (Loughborough University of Technology, England) Bennetts, D (Alberta University, Canada) McGinity, PD (London Borough of Wandsworth) *Transportation Research Record* No. 588, 1976, pp 18-26, 9 Fig., 6 Tab., 16 Ref.

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10 159712

**TIME-STAMPING: A NEW WAY TO SURVEY PEDESTRIAN TRAFFIC IN AIRPORT TERMINALS**

The author has developed a new method for collecting pedestrian traffic flow data in airport terminals. The method was developed for the Airport



Facilities Branch of the Canada Ministry of Transport. the problem was to find a better way of conducting terminal surveys. Traditional interview surveys and time and motion studies yield only fragmented bits of information. A total systems approach was required. The method consists of handing a card to each person as he or she enters the terminal either at the gate or at the door. The person is asked to carry the card during his or her stay in the terminal. At various check points the card is time-stamped. When the person leaves the terminal, the card is collected. The result is a complete trace of his or her movements in the terminal. A pilot study to test this technique was conducted at the Winnipeg International Airport on August 1 and 2 1975. The survey was successful: 10-55 cards were carried successfully through the terminal for 2 days, 96 cards were discarded and recovered, and about 150 cards were unaccounted for, which is a 98 percent return. The result is a complete travel pattern for each person. The data are so comprehensive that they will yield volumes, flow rates, occupancies, queuing length, service times, delays, levels of service, velocities, densities, flow pattern, conflicts, processing line balance, space use, and total travel effort. /Author/

This article appeared in TRB Record, 588 Airport and Air Transport Planning.

Braaksma, JP (Carleton University, Canada) *Transportation Research Record* No. 588, 1976, pp 27-34, 3 Fig., 2 Tab., 9 Ref.

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**DON'T FORGET THE TRANSFER PASSENGER [Den Umsteiger nicht vergessen]**

The importance of providing adequate space and facilities for passengers in transit during the planning process of new airports and buildings is emphasized. Guidelines for streamlining the flow of transit passengers at airports are given.

*Airport Forum* Vol. 6 No. 3, June 1976, pp 7-9

ACKNOWLEDGMENT: EI  
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**COMPREHENSIVE PUBLIC ADDRESS SOUND SYSTEM FOR FRANKFURT-ON-MAIN AIRPORT**

This article describes the comprehensive sound system installed at Frankfurt-on-Main airport to supply the whole area as well as individual departure lounges. The supervisory equipment in the amplifier room comprises automatic test and standby amplifier switching facilities. Announcements are transmitted from a flight information center equipped with two announcer consoles and a luminous annunciator board. Allocation of amplifiers to zones is flexible and accomplished via a relay switching system with a crossbar distributor. A separate installation is provided for announcements to visitors.

Raitz, W *AEG[Telefunken Progress]* No. 1, 1975, pp 20-23

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10 163496

**COMPUTER SIMULATION MODEL FOR THE DESIGN OF AIRPORT TERMINAL BUILDINGS**

The computer simulation model is intended as an appraisal tool in the designing of airport terminal buildings such that the efficiency of alternative design solutions can be readily compared. This is essentially a "queueing model" in which all possible activities in the terminal building are represented as a network of activity nodes. The simulation is time-based and monitors the variation in queue sizes over the time period being simulated for a given throughput of passengers, visitors, greeters etc. The model is deterministic and does not consider the effect of stochastic variations in service time. It is argued that such variations have little effect on systems as large and complex as airport terminals, however, the inclusion of such techniques in the model is being investigated.

Laing, LWW (Strathclyde University, Scotland) *Computer Aided Design* Vol. 7 No. 1, Jan. 1975, pp 37-42

ACKNOWLEDGMENT: EI  
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10 203784

**DESIGN FACTORS-PASSENGER AND CARGO TERMINALS AND ASSOCIATED HANDLING AREAS, WITH DISCUSSION**

the design and layout planning of a passenger terminal complex in a major civil airport are examined in terms of systems and flow routes intended to facilitate and shorten the beginning or the end of A journey by air. Requirements and guidelines are given for the design of the interface with surface transit systems, check-in facilities, government control areas, information centers, baggage handling systems, passenger loading bridges, gate lounges, and electronic equipment. Aircraft parking aprons and required aircraft maneuvers are considered together with cargo handling facilities. /iaa/

Tutty, EB

Civil Aviation Safety Center Conf Proc 1971, 15 pp

ACKNOWLEDGMENT: International Aerospace Abstracts

10 203787

**AIRPORT TERMINAL DESIGN-THE PASSENGER'S POINT OF VIEW**

deficiencies in access facilities and passenger processing methods at most current airport terminals are illustrated by a typical schedule for the ground mode of an airline trip originating in a major city. Excessive ground travel time to the airport, excessive distances to be covered at the airport itself, baggage handling procedures, and official documentation are shown to produce delays that can generally be identified with overall planning geared to concepts from the early days of aviation. A modular design of a terminal is proposed to relieve sequential delays caused by mutual interplay between various bottlenecks. Standard departure gates, coded boarding passes, automatic baggage delivery, and televised inspection of documents are recommended. /iaa/

Wild, RH *Interavia* Vol. 27 June 1972, pp 640-1

ACKNOWLEDGMENT: International Aerospace Abstracts

10 203788

**KANSAS CITY-THE AIRPORT WITH SHORT WALKING DISTANCES**

the overall design, major features, and some of the facilities of the Kansas city international airport are described. Later in 1972, when the airport opens, it will have three of its circular buildings operational. Capacity will be 12 million passengers per year. The master plan provides for a fourth terminal building to be added when required. Cost of the first three modules is a total of approximately \$24 million or about \$24 per square foot, not including site development, paving, roadways, bridges, furnishings, and tenant improvements. Two earlier built runways have been extended to 10,800 and 9500 ft. The decentralized processing and information display systems are reviewed. /iaa/

Kivett, HA *Airport Forum* June 1972, 6 pp

ACKNOWLEDGMENT: International Aerospace Abstracts

10 203792

**THE CENTRAL TERMINAL-FRANKFURT'S VISTING CARD**

the new central terminal at Frankfurt airport that has been in operation for six months is described. The new building is regarded as one of the most widely acclaimed airport projects in the world. It is described along with the circumstances that have motivated the choices underlying its design. The testing troubles encountered in its initial operation phase are discussed, and the need for better cooperation between airport and airline administrations is pointed out. Three brief reports by station managers of major airlines complement the review. /iaa/

Becker, E *Airport Forum* Sept. 1972, 4 pp

ACKNOWLEDGMENT: International Aerospace Abstracts

10 226655

**AIRPORT TERMINAL FLOW SYSTEMS AND RELATED TRANSPORTATION INTERFACES**

considerations are given concerning a more expedient handling of airport passenger traffic to cope with the growing requirements of an expanding air transportation industry. Aspects of airport access, terminal passenger and

baggage handling, cargo handling, and government controls are discussed in terms of efficiency, convenience and time saving. /iaa/

Tutty, EB  
British Air Line Pilots Association Paper Nov. 1971, 7 pp

ACKNOWLEDGMENT: International Aerospace Abstracts

## 10 242448 SYSTEMS APPROACH TO AIRPORT PASSENGER TERMINAL PLANNING

the objective is defined as the provision of transfer facilities between aircraft and ground transportation which are as convenient to the passengers as economically possible and ensure continuing convenience throughout the life of the terminal. Three evaluation criteria are defined: passenger convenience, economy, and flexibility. A systematic planning approach is presented in which terminal concepts are analyzed in the light of these criteria. Two primary tasks are identified for the planning process: to overcome the spatial incompatibility of the airside, the terminal building, and the groundside and to ensure maximum sharing of terminal facilities by successive users. The first task is aimed at the maximization of passenger convenience through a reduction of walking distances. The second task is aimed at the maximization of economy and is usually in conflict with the first. /author/  
proceedings of a conference, sandefjord, Norway, 14-18 august 1972.

Elek, A  
Western Periodicals Company Aug. 1972, pp 411-23

ACKNOWLEDGMENT: International Aerospace Abstracts

## 10 242718 PEOPLEMOVERS: YESTERDAY, TODAY, AND TOMORROW

Data are provided for the components of the operation of nine peplemover systems, which indicate that these have advanced technologically to the

point where there is sufficient diversity in size, speed, and passenger-carrying capacity to enable them to be considered for almost any pedestrian traffic problem. The number of future applications found for these systems, however, will depend greatly upon their economic viability. Three situations currently appear most likely for applying peplemovers to pedestrian traffic movement, the airport, the shopping center, and the central business district. Even considering the recent lapse in growth rate of air travel and the complex political-economic-social structure of local governments, long-term prospects for successful applications of peplemovers are excellent.

Schnell, FL *Traffic Quarterly* Vol. 28 No. 1, Jan. 1974, pp 5-20

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## 10 260226 ANALYSIS OF PASSENGER DELAYS AT AIRPORT TERMINALS

Although supportive numerical data have not been collected, specific consideration has been given to the operation of Toronto International Airport to show the procedure of analysis in detail. The following conclusions are arrived at: Unavoidable delays to departing passengers arise from the safety time they allow for variance in airport access and from the time they must allow for their baggage to be moved onto the aircraft. Involuntary delays to arriving passengers arise in waiting for their baggage and possibly in final customs. Airlines might help avoid excessive delays by: (1) Not duplicating the passenger's safety time allowed for variance in airport access time; (2) giving priority egress to passengers without checked baggage; and (3) speeding up baggage handling. Improved scheduling of aircraft and faster, more reliable airport access, rather than improved terminal operations hold the main keys to faster overall air travel.

Yager, S (Waterloo University) *ASCE Journal of Transportation Engineering* Vol. 99 No. TE4, Proc. Paper 10152, Nov. 1973, pp 909-922, 4 Fig., 5 Ref., Apps.

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10 155562, 10 155836, 10 155837, 03 261216

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09 131162, 09 131163, 09 131164, 09 131165, 09 131167, 09 131168,  
09 131172, 09 131173, 09 131174, 09 131177, 10 131176

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03 090347, 03 090348, 03 261137, 04 090622



# AUTHOR INDEX

## A

**ACHITOFF, L**  
 08 155514  
**ADAKAR, DB**  
 08 155831  
**ADLER, RM**  
 10 152865  
**AGEE, PH**  
 10 155924  
**AHLBERG, CF**  
 03 155723  
**AKIYAMA, T**  
 01 241456  
**ALEXANDRE, A**  
 03 155743, 03 155928  
**ALLEN, R**  
 01 155497, 06 155846  
**ALLEN, WB**  
 05 131170  
**ALLUM, RD**  
 06 155884  
**ALTSHULER, E**  
 01 046998, 01 155680  
**ANDO, Y**  
 03 155929  
**ANDRENUCCI, M**  
 07 163537  
**ANDREWS, JJ**  
 03 158238  
**ANEURYN-EVANS, GB**  
 02 155672  
**ANTHROP, DF**  
 03 261149  
**ARATA, WH, JR**  
 05 155872  
**ARCHER, BH**  
 04 158216  
**ARMSTRONG, HW**  
 01 155674  
**ASHFORD, N**  
 01 097723, 10 155537, 10 155562,  
 10 155836, 10 155837, 10 159711  
 02 155816  
**ASTHOLZ, PT**  
 08 155558

**ATHANS, M**  
 08 075265, 08 090717  
**AUGUSTINUS, G**  
 04 155453  
**AUTL, RL**  
 08 200606  
**AVTERIO, VJ**  
 08 163515

## B

**BACH, W**  
 03 155742  
**BALES, GA**  
 06 155569  
**BALES, RA**  
 08 054427, 08 092175  
**BALL, CT**  
 08 057000, 08 093584, 08 150729,  
 08 154310  
**BALNKENSHP, EG**  
 08 155547  
**BARAN, G**  
 08 054427  
**BARBER, JL**  
 08 155867  
**BARNUM, JW**  
 09 131157  
**BARON, P**  
 10 155571  
**BARRY, DJ**  
 03 093811  
**BARTEL, C**  
 03 090347, 03 090348  
**BATCHELDER, JH**  
 01 047566  
**BAUML, SF**  
 02 155689  
**BAXTER, RG**  
 01 241963  
**BECKER, E**  
 10 203792  
**BEINHAKER, P**  
 10 155925  
**BEINHAKER, PH**  
 09 131158  
**BELAND, RD**  
 03 075396, 03 239973

**BENDER, LE**  
 01 155697  
**BENNETT, JC**  
 01 080637  
**BENNETTS, D**  
 10 155537, 10 155562, 10 155836,  
 10 155837, 10 159711  
**BENSTEAD, R**  
 08 155704  
**BERGER, MM**  
 03 155524  
**BERGLUND, B**  
 03 155942  
**BERGLUND, V**  
 03 155942  
**BERGMANN, EP**  
 03 094165, 03 094172  
**BERKAU, EE**  
 03 094296  
**BESS, HD**  
 02 155736  
**BILLINGHAM GD**  
 06 155884  
**BINGHAM, WA**  
 08 200606  
**BISHOP, DE**  
 03 091198, 03 133135, 03 143124,  
 03 155502, 03 155926, 03 224654  
**BLOCK, J**  
 03 155835  
**BLUESTONE, DW**  
 04 155574  
**BLUMENTHAL, VL**  
 03 155943  
**BLUMER, TP**  
 10 155625  
**BOLLAG, M**  
 08 207518  
**BONDA, WAT**  
 08 073774  
**BOOKER, NC**  
 04 136851  
**BOOTHBY, J**  
 02 155816  
**BORSKY, PN**  
 03 155789

**BOSSE, CB**  
 10 155578  
**BOSTROM, B**  
 02 155678  
**BOTTOM, CG**  
 03 261122, 03 261216  
**BOULOGIANE, IA**  
 08 155532  
**BOULTER, MJ**  
 07 163493  
**BOWE, J**  
 10 148872  
**BOWER, LL**  
 04 139614  
**BOWLES, JV**  
 03 137194  
**BRAAKSMA, JP**  
 10 127692, 10 144428, 10 155539,  
 10 159712  
**BRANCH, MC**  
 03 239367, 03 239973  
**BRANT, AE, JR**  
 08 260232  
**BREAK, GF**  
 02 155735  
**BRENDLIN, K**  
 10 158219  
**BREWER, GD**  
 06 151572  
**BRINK, M**  
 09 131163  
**BRISCOE, V**  
 09 127047  
**BROMLEY, E, JR**  
 08 163524  
**BROWN, D**  
 03 155812  
**BROWN, DG**  
 01 155721  
**BROWN, J**  
 03 155813, 05 155862  
**BROWNE, JJ**  
 01 226285, 10 155634, 10 155641  
**BRUCE, WC, JR**  
 04 159709  
**BRUGGEMAN, JM**  
 01 241433

# Author Index

BUCHBINDER, A  
05 155746  
BURNS, EM  
03 155936  
BUSCH, RE  
08 155648  
BUSCHKY, W  
05 155844  
BUTTON, DL  
06 155866  
BYERS, RH  
01 226654

## C

CAFFERY, TG  
01 147384  
CAIRNS, R  
03 226630  
CAIRNS, VW  
09 163483  
CALLAHAN, RH  
09 131167  
CAMAIONI, JE  
03 155932  
CAMP, DW  
07 163479  
CAMPANELLA, AJ  
03 155772  
CAMPBELL, GE  
05 155747  
CANN, RG  
03 155805  
CANNEMEIJER, F  
08 151570  
CARBERRY, T  
09 131164  
CARBERRY, TF  
01 093409  
CARL, R  
03 075504  
CARLIN, A  
02 155651, 08 155632  
CARLOCK, JK  
02 163535  
CARPENTER, B  
06 155794  
CARROLL, FT  
01 155923  
CERWONKA, R  
08 155681  
CHAMBERS, EV, III  
08 128751  
CHAMPNISS, GA  
08 155898  
CHAUMONT, RC  
08 154296  
CHERRY, GW  
08 155516, 08 155517  
CHESSHIRE, LM  
01 242579  
CHEU, DH  
07 155873  
CHILDS, JT  
07 163500  
CHISHOLM, DA  
08 163534  
CHISHOLM, DH  
08 163540  
CHMORES, T  
08 128751  
CHRISTIAN, RW  
10 155584  
CHRYSANDREAS, A  
08 155809  
CIRILLO, RR  
03 155932  
CLAVELOUX, BA  
01 155533  
CLEARY, EF  
01 155484

CLOUD, BB  
06 080981  
COLBATZKY, M  
08 155573  
COLLINS, FL  
03 240761  
CONIN, H  
05 155758  
CONNOR, WK  
03 155810, 03 240207, 03 155501  
CONSTANTZ, JC  
08 200606  
COOK, KE  
01 241455  
COOPER, BK  
03 143176, 03 155810  
COOPER, T  
01 147044  
CORCORAN, PJ  
01 155911  
CORDLE, SR  
03 094296  
CORRADINO, JC  
01 155484, 01 239614, 02 159713,  
09 155601  
COUGHLIN, C  
03 090348  
COULURIS, GJ  
08 154739  
COURTNEY, JL  
04 155891  
COX, RM  
08 158224  
CRAWFORD, HR  
08 155713  
CREAMER, LR  
03 155939  
CROUSILLAT VELASCO, C  
08 155498  
CROWLEY, RW  
02 155673  
CUADRA, E  
03 155931  
CUMING, D  
01 147044  
CUSHING, EM  
03 155936

## D

D'ALESSANDRO, F  
08 094531, 08 094536, 08 094537,  
08 094538  
D'AULERIO, H  
08 163524  
DAELLENBACH, HG  
08 155487  
DAILEY, JT  
07 163525  
DAJANI, JS  
03 155886  
DALLMAN, JP  
03 291036  
DALY, M  
06 203778  
DANIELS, A  
03 155742  
DANNENBRINK, TD  
02 155734  
DASSINA  
04 158214  
DAVINROY, TB  
08 155474  
DE BALARD, J  
06 155896  
DE NEUFVILLE, R  
01 051438, 01 073899, 01 155492,  
01 202301, 01 241534, 01 260792,  
05 155467, 10 131176, 10 155458

DE VILLENEUVE, LC  
08 155892  
DE WOLF, B  
08 155516, 08 155517  
DEJONGH, JP  
08 151570  
DELLAWAY, TK  
01 265475  
DEMINUS, MI  
05 155862  
DEVA-ADITYA, NJ  
03 155766  
DEVANY, AS  
04 155545  
DIENEMANN, PF  
02 159574  
DIGENOVA, R  
10 073897  
DIMSTER, F  
06 155884  
DINI, D  
07 163537  
DOGANIS, RS  
02 155727  
DOLD, EP  
02 155889  
DOMINUS, MI  
03 155813  
DOREY, F  
07 155741  
DOUGHERTY, WE  
08 200606  
DOVALI, F  
06 131161  
DOYLE, KM  
09 155620  
DOYLE, RH  
03 155792  
DUBROW, RB  
02 155494  
DUGGAN, LF  
02 131159  
DUNDERDALE, TC  
03 143124  
DUNKIN, TG  
06 155865  
DUNLAY, WJ  
01 152720  
DUNLAY, WJ, JR  
01 098920, 01 147384, 01 155682,  
01 155843, 08 128751  
DUNNING, HC  
05 147030  
DYGERT, PK  
02 155733, 03 240761  
DYMENT, R  
07 163506

## E

ECKERT, RD  
02 155615, 02 155732  
EDMISTON, RD  
03 143176, 08 080174, 08 080175,  
08 080176  
EDMISTON, RP  
03 240207  
EGAWA, J  
03 155929  
ELBERT, TF  
03 155778  
ELDRED, KM  
03 155777  
ELEK, A  
10 242448  
ELLIS, RH  
01 080637  
ELLIS, WW  
04 136851  
EMBLETON, TFW  
03 155938

ESMER, GP  
10 155841  
EULA, E  
03 155914  
EVERETT, JL  
08 155532

## F

FALLON, AJ  
09 121165  
FARMERY, R  
07 155755  
FASSINA, G  
06 158217  
FASULLO, EJ  
09 163504  
FAY, DR  
10 155457  
FAY, JA  
03 155861  
FELDSTEIN, IS  
04 136851  
FERGUSON, WD  
08 155764  
FERRAR, TA  
05 155694  
FERRERI, MG  
01 155484  
FICHTL, GH  
07 163479  
FIDELL, S  
03 155820, 03 155920  
FIELD, H  
08 155639  
FIELDHOUSE, IB  
03 094165, 03 094172  
FISHER, L  
02 155751  
FITZGERALD, EVK  
02 155672  
FLORY, RC  
06 143761  
FLOWERDEW, ADJ  
03 155518  
FORDYCE, JS  
03 155934  
FORSYTH, PJ  
02 155675  
FOSTER, CR  
03 155780  
FOWLER, J  
06 147285  
FOWLER, WK  
01 155556  
FRANKLIN PIERCE LAW CEN-  
TER  
03 155511  
FRASER, J  
06 130428  
FRECH, GM  
03 155829  
FROMOVITZ, S  
06 155874  
FROST, W  
07 163479  
FURUKAWA, S  
03 155784

## G

GABRIEL, RF  
03 155939  
GAGE, H  
07 163516  
GALE, DB  
10 155749  
GALLOWAY, WJ  
03 091196, 03 224654  
GARGES, EH  
04 155545  
GAUTHREAUX, SA, SR  
08 163533

# Author Index

GEISLER, MA  
05 155542  
GELERMAN, W  
01 260792  
GELLMAN, A  
02 131159, 09 131156  
GENEST, B  
01 155464  
GENTRY, DE  
09 155620  
GERHARDT, JM  
03 155813  
GIBSON, D  
08 155753  
GILL, G  
07 155489  
GILLESPIE, PR  
10 155916  
GILLFILLAN, WE  
08 155627  
GLICK, JM  
03 137194  
GODFREY, JT  
08 158237  
GOLDBERG, DL  
09 163505  
GOLDMAN, D  
08 080277  
GOLDSTEIN, A  
08 155907  
GOLDSTEIN, S  
03 155521  
GOLLWITZER, WH  
01 132054  
GORDON, S  
04 155650, 08 155649  
GRAHAM, JL  
01 155463  
GRAY, AD  
06 130428  
GRAY, P  
10 155887  
GREIN, C  
06 155884  
GRISSEL, CR  
08 092377  
GROSCH, RF  
05 155679  
GUALDA, NDF  
08 128751  
GUO, HM  
09 163483  
GUSKI, R  
03 155930  
GUTH, HJ  
04 155452

## H

HABERCOM, GEJ  
03 093837, 03 143814, 04 090888  
HAEFNER, LE  
05 159714  
HAGER, P  
05 143742  
HAGEROTT, RE  
08 093888  
HAHN, HR  
09 163494  
HAINES, AL  
08 050141  
HAINES, RF  
08 080276  
HALEY, P  
08 155851  
HALL, EN  
08 155717  
HALLOCK, JN  
08 163511  
HALVERSON, AG  
08 154306

HAMMARSKJOLD, K  
04 155908  
HANEY, DC  
04 163514, 04 163521  
HANEY, DG  
04 143864, 04 163522, 04 163523  
HARBIDGE, JF  
01 202532  
HARRIS, AS  
03 155774  
HARRIS, RM  
08 155817  
HARRISON, OC  
03 223511  
HART, PD  
03 094296  
HARTLEY, HF  
08 158237  
HAWKINS, NM  
10 155537, 10 155562, 10 155836,  
10 155837, 10 159711  
HAYASHI, C  
03 155773  
HAYS, AP  
03 133135, 03 155462  
HAYS, MB  
07 155873  
HEATHINGTON, KW  
09 131155, 09 131162  
HEDWALL, RF  
07 163498  
HEERE, E  
06 158215  
HEINZ, RA  
06 163536  
HEISER, W  
08 094531, 08 094536, 08 094537,  
08 094538  
HENGSBACH, H  
08 155479  
HENNING, D  
04 163484, 10 155571  
HENRY, L  
01 098920, 01 147384  
HESSE, JE  
01 155661, 04 155662  
HIATT, D  
04 155650  
HIERING, WA  
08 092377  
HILGERT, RJ  
08 200606  
HILL, JH  
10 148872  
HILSCHER, G  
10 155918  
HIMMEL, NS  
01 155629  
HINTZE, C  
08 200606  
HIRJI, FKI  
03 144429, 03 155819  
HOBBS, R  
05 143742  
HOCH, CJ  
10 155504  
HOCKADAY, SLM  
08 155486  
HODDER, JC  
01 227950  
HOHLE, K  
03 155803, 08 155543  
HOLDEN, WHT  
01 265475  
HOLE, G  
01 241457  
HOLTHUS, DE  
08 155714  
HOM, RE  
09 131172

HOMANS, BL  
03 144322, 04 147239  
HOOTON, EN  
08 073774  
HORN, WA  
08 203798  
HORONJEFF, R  
06 129627, 08 155621, 08 155895,  
10 155504  
HORONJEFF, RD  
03 091197, 03 137104, 03 143124  
HORONJEFF, RGD  
03 261289  
HOUSE, ME  
03 163480  
HOWARD, GP  
04 155453  
HSIN, CC  
08 155460  
HSUEH, T  
08 080640  
HUESLER, H  
10 155853  
HUGGETT, JWE  
08 155505  
HURLBUT, LJ  
06 155884  
HURST, F  
01 155528, 04 155729  
HUSON, RW  
08 155754  
HUSSAIN, A  
06 158236  
HUTCHINS, JL, JR  
05 159714

## I

ICENOGL, W  
01 155698, 01 241458  
INGRAM, D  
03 155520  
ISRAEL, DR  
08 155471  
IYER, RR  
08 080277

## J

JACKSON, R  
02 155670  
JACKSON, WE  
07 155554  
JAKOBSBERG, W  
02 163508  
JANK, BE  
09 163483  
JAREMA, FE  
01 155484  
JARVIS, JJ  
02 159713  
JAWORSKI, A  
02 155725  
JEROME, A  
06 155695  
JHAVERI, AG  
03 155786  
JINDIA, G  
05 143742  
JOERGER, RK  
02 155730  
JOHN, JI  
10 155703  
JOHNSON, NL  
04 155451  
JOHNSTON, W  
08 155750  
JONES, DH  
09 131162  
JONES, G  
03 155920  
JORDAN, D  
01 155541

JOST, A  
09 158220  
JUDEM, RJ  
08 155499

## K

KAJLAND, AR  
03 155941  
KANAFANI, A  
01 155477, 03 155917, 08 155486  
KANDUKURI, RR  
03 091197  
KANGAS, R  
10 148872  
KARASH, K  
10 073884  
KARASH, KH  
10 155622  
KAROL, EM  
07 163516  
KARPLUS, HB  
03 261041  
KELLY, JJ  
10 155641  
KERR, RD  
08 159710  
KESTER, JD  
03 158239  
KIEFER, DW  
02 074545  
KIEHNE, E  
02 155889  
KIERNAM, J  
04 155566  
KILIAN  
01 072047  
KIM, WI  
04 240712  
KING, JD  
07 094542  
KINNEY, WA  
03 224129  
KIRBY, WE  
07 163492  
KIVESTU, P  
08 143307  
KIVETT, HA  
10 155684, 10 203788  
KLATT, K  
10 155845  
KLAUS, PA  
03 093653  
KLEIN, L  
08 163502  
KLEINFELD, RL  
03 131169  
KLINE, DM  
03 093811  
KLINGEN, LG  
09 131177, 10 155882  
KNIGHTS, G  
08 094531, 08 094536, 08 094537,  
08 094538  
KNOWLES, RC  
02 155527  
KODAMA, H  
03 155773  
KOERITZ, KW  
09 163529  
KOETSCH, JF  
08 054427, 08 092175  
KOLECP  
01 226911  
KOLLER, F  
01 073886, 01 241534  
KOLLER, P  
01 155495  
KONDO, S  
03 155773  
KOOMANOFF, FA  
01 155656



# Author Index

KOOPMAN, BO  
 08 155493, 08 155532  
 KOPPE, E  
 05 155769  
 KORYCINSKI, PF  
 08 163526  
 KOZLEK, PS  
 08 200606  
 KRUSE, H  
 08 163534  
 KUCKUCK, HH  
 10 155847  
 KULLSTAM, A  
 08 203791  
 KURT, TL  
 05 163530  
 KURZ, JW  
 01 155677

## L

LABRECHE, RM  
 03 154396  
 LAGO, AM  
 02 159574  
 LAING, LWW  
 10 163496  
 LAM, RC  
 03 155905  
 LAMAGNA, F  
 01 263929  
 LAMPERT, S  
 01 155923  
 LANDAU, U  
 01 260792  
 LANDIERE, SA  
 01 155484  
 LANE, SR  
 03 155795, 03 155827, 03 155937,  
 03 155940  
 LANGDON, LE  
 03 155939  
 LARGE, JB  
 03 155787, 03 155804, 03 155905  
 LATHROP, WH  
 01 155680  
 LATIN, M  
 08 155945  
 LAWRENCE, DS  
 01 201742  
 LE BOURGEOIS, P  
 10 155641  
 LEBOWITZ, S  
 01 241559  
 LEDER, WH  
 01 155483  
 LEDERER, J  
 03 155605  
 LEINEMANN, H  
 05 155769  
 LENARD, M  
 10 148872  
 LEWIN, D  
 10 155701  
 LEWIN, G  
 01 155548  
 LICHFIELD, N  
 02 155906  
 LICK, WJ  
 03 136670  
 LINDELL, HW  
 01 073875  
 LINDUALL, T  
 03 155942  
 LINN, RJ  
 08 155831  
 LINTHACUM, WW  
 06 155876  
 LITCHFORD, GB  
 08 155559  
 LITTLE, IMD  
 02 155667

LODGE, JE  
 07 163507  
 LOHKAMP, CW  
 08 163482  
 LOTT, HG  
 10 158218  
 LOVELL, A  
 10 155811  
 LUI, R  
 10 155634  
 LYNAGH, PM  
 03 155744, 03 261399  
 LYON, RH  
 03 155921, 03 224129

## M

MACKENZIE, FD  
 08 155596  
 MACKINNON, D  
 08 155516, 08 155517  
 MADDISON, D  
 08 155831, 08 155895, 09 131163  
 MAGINNIS, FX  
 03 154741  
 MAKSOUD, H  
 06 155806  
 MAMA, HP  
 05 155849  
 MANN, PP  
 03 075396  
 MANSBACH, PA  
 03 154741  
 MAPLES, AL  
 04 155871  
 MARCUS, HS  
 02 155736  
 MARINO, J  
 10 148872  
 MARSH, AH  
 03 158221  
 MARTIN, B  
 03 155930  
 MARTIN, FF  
 02 155600, 02 155731  
 MARTIN, JN  
 02 155696  
 MASEFIELD, P  
 06 155842  
 MASEFIELD, PG  
 04 155901  
 MASON, JG  
 10 155580  
 MASON, R  
 01 223420  
 MASSE, D  
 06 130428  
 MATSCHAT, K  
 05 155769  
 MAXFIELD, DP  
 06 155874  
 MAXWELL, WW  
 01 155762  
 MAYES, BJ  
 10 155748  
 MAYOR, ER  
 08 155852  
 MCAWARD, PJ, JR  
 08 260232  
 MCCABE, L  
 01 093409, 09 131164  
 MCCAGG, EK  
 10 155927  
 MCCULLOUGH, BF  
 08 127693, 08 128751  
 MCGINITY, PD  
 02 155816, 10 155537, 10 155562,  
 10 155836, 10 155837, 10 159711  
 01 097723  
 MCGINNIS, NF  
 01 051555  
 MCKENZIE, AJ  
 08 155505  
 MCLAUGHLIN, WA  
 03 228038  
 MCLEOD, KN  
 02 155667  
 MCMAHON, NM  
 03 261131  
 MCPIKE, AL  
 03 155644  
 MEECHAM, WC  
 03 155940  
 MEEHAN, JA  
 09 155576  
 MEISTES, FA  
 05 155770  
 MENDIAS, ML  
 03 154396  
 MENNIE, D  
 01 155738  
 MERRITT, FS  
 06 155546  
 MEYER, GE  
 07 163493  
 MICHAEL, RS  
 05 131166  
 MIERZEJEWSKI, E  
 01 051438, 01 073899, 01 202301  
 MILLER, D  
 02 155508  
 MILLER, DR  
 01 265475  
 MILLER, GA  
 09 131168  
 MILLS, JF  
 03 143124, 03 143153  
 MILLS, MH  
 06 080796  
 MIRSKY, HM  
 01 263929  
 MISHAN, EJ  
 03 155668  
 MOGHARABI, A  
 03 155917  
 MONTELEON, P  
 08 094531, 08 094536, 08 094537,  
 08 094538  
 MOORE, CA  
 01 155760  
 MOORE, H  
 10 155458  
 MOORE, H, III  
 01 260792  
 MOORE, HL, JR  
 04 155450  
 MOORE, KC  
 07 155591  
 MOORE, RA  
 08 158237  
 MORAN, J  
 03 090348  
 MORIN, S  
 08 154726  
 MOSER, R  
 02 155889  
 MOSES, N  
 03 155722  
 MOSS, WD  
 10 155841  
 MOUSSALLY, GJ  
 08 158237  
 MUEHLBERGER, R  
 01 241460  
 MULLER, EA  
 05 155769  
 MULLETT, LB  
 01 155911  
 MUMPHREY, AJ  
 03 240691  
 MUND, AJ  
 01 155465

MURPHY, HJ  
 07 127284  
 MURRAY, JJ  
 08 155710

## N

NAKANE, Y  
 03 155929  
 NANDA, R  
 10 155634  
 NANNI, H  
 10 155706  
 NASH, P  
 07 163507  
 NASH, TW  
 02 155736  
 NATHANSON, J  
 06 155695  
 NEGRETTE, AJ  
 01 155531, 01 260186, 09 131173  
 NELSON, JP  
 02 155523  
 NEMEC, J, JR  
 06 155878  
 NEWMAN, HL  
 06 155877  
 NEWSOM, D  
 08 154726  
 NICHOLSON, RA  
 01 155880  
 NISHINOMIYA, G  
 03 155784  
 NOZICK, JS  
 05 155791  
 NWANERI, VC  
 02 155671

## O

O'LEARY, M  
 10 155537, 10 155562, 10 155836,  
 10 155837, 10 159711  
 O'NEILL, JB  
 08 090395  
 ODONI, AR  
 08 074073, 08 143307, 08 155468,  
 08 155503, 08 155643, 09 155620  
 OGDEN, KW  
 08 155505  
 OIESEN, JF  
 04 155650  
 OLLERHEAD, JB  
 03 155766, 03 155854  
 OPPENHEIM, PT  
 06 155455  
 ORMAN, JC  
 09 131172, 09 226289

## P

PAIK, IK  
 03 155617  
 PANDE, L  
 03 224129  
 PARASAS, JD  
 10 155637  
 PARK, CH  
 08 128751  
 PARK, RE  
 02 155651, 08 155632, 08 155669  
 PARKES, GM  
 08 163486  
 PASMOOIJ, CK  
 08 154336  
 PATTERSON, HP  
 03 155501, 03 240207  
 PATTERSON, M  
 06 130428  
 PAUL, JF  
 03 136670  
 PAULLIN, RL  
 01 155830, 05 155513, 08 131171

# Author Index

PEARSON, PM  
03 228038  
PEARSONS, KS  
03 261289  
PENDAKUR, VS  
01 200156  
PENZIEN, J  
08 080640  
PERACCHIO, AA  
03 158239  
PERLSTEIN, SL  
09 163505  
PESTALOZZI, G  
10 155706  
PETERSEN, RH  
03 093811  
PICKREL, EW  
07 163525  
PIERCY, JE  
03 155938  
PIPER, HP  
10 155570  
PIPER, RR  
02 155480, 08 155711, 08 202302  
PLOWDEN, S  
03 201520  
PONTIER, WE  
01 158240  
PORTER, LW  
08 075265  
POULTON, MC  
01 155477  
PRAVDA, M  
08 163524  
PRAVICA, P  
03 155781  
PRENTICE, ES  
02 155715  
PRIVER, A  
10 148872  
PROCTER, HS  
08 154739  
PROKOSCH, W  
06 155712, 10 073882  
PUCKETT, HK  
01 265478  
PULLING, RW  
04 155452  
PUTUKIAN, J  
10 148872

## Q

QUIGG, LC  
03 155759  
QUINN, RW  
03 091352

## R

RACH, K  
01 226761  
RAITZ, W  
10 163495  
RAMSDEN, JM  
07 155593  
RANDORFF, JE  
05 084118  
RANGER, FW  
08 154295  
RANSONE, RK  
03 155793  
RASSAM, PR  
01 080637  
READ, RA  
02 155724  
REDDINGIUS, NH  
03 091197, 03 136661, 03 155771  
REFFELT, R  
08 094531, 08 094536, 08 094537,  
08 094538  
REID, M  
01 241332

REMPFER, PS  
08 155595  
RICHARDS, EJ  
03 155728, 03 155768, 03 155854  
RICKLEY, EJ  
03 091352  
RINKE, HO  
03 155930  
ROBSON, CA  
09 163529  
ROCKWELL, EL  
01 155762  
ROESELER, WG  
01 155698  
ROGERS, RA  
04 159709  
ROHRMAN, B  
03 155930  
ROLLWITZ, WL  
07 094542  
RONAN, WJ  
01 242534  
ROPER, WE  
03 155931  
ROSS, HR  
01 099521  
ROTE, DM  
03 155935  
ROUSE, WB  
08 073974  
RUBIN, D  
06 146652  
RUGER, JF  
08 163538  
RUGGLES, BF  
07 163492  
RUSCONI-CLERICI, I  
08 155645  
RUSSELL, RE  
03 155943

## S

SAINT JOHN, OB  
03 155776  
SANDERS, DB  
01 051466, 01 051467, 01 263930  
SANDSTROM, J  
08 163527  
SASAKI, F  
03 155784  
SAUNDERS, L  
01 228529  
SCALEA, JC  
08 155947  
SCELZO, GP  
10 155757  
SCHEICHL, L  
07 155848  
SCHELLENBERG, S  
08 163539  
SCHERPBIER, LW  
10 155807  
SCHETTINO, JC  
05 155791  
SCHIMPELER, CC  
02 159713, 09 155601  
SCHNAUFER, K  
08 203781  
SCHNELL, FL  
10 242718  
SCHOMER, PD  
03 144322, 04 147239  
SCHRODER, BL  
02 155798  
SCHULTZ, TJ  
03 261131  
SCHUMER-KOHR, A  
03 155930  
SCHUMER, R  
03 155930

SCHWERDT, KR  
08 155648  
SCOTTO, M  
08 154726  
SEBRING, JR  
08 158224  
SEGAL, HM  
03 155933  
SEKYRA, CA  
03 155944  
SELEY, JE  
03 240691  
SHACKEL, B  
08 163502  
SHANNON, JD  
03 155883  
SHAPIRO, N  
03 155779  
SHARMAN, FA  
06 155802  
SHAW, SD  
07 094542  
SHEIBLEY, DW  
03 155934  
SHENG, YP  
03 155814  
SHEPHERD, KP  
03 154083  
SHEPHERD, WT  
03 093724  
SHEPPARD, WV  
01 155687  
SHERMAN, L  
01 155482  
SHEVELL, RS  
03 137194, 08 155536  
SHIELDS, CB  
01 073875, 01 226654  
SHINE, A  
08 155851  
SHORTREED, JH  
10 127692, 10 144428  
SHPILBERG, D  
07 163513  
SIBERT, EG  
06 155912  
SIDONS, JK  
05 155759  
SIFTAR, R  
01 147044  
SILENCE, SM  
01 155484, 01 242579  
SIMON, GR  
03 094296  
SIMPSON, KH  
04 155745  
SIMPSON, L  
03 090347  
SIMPSON, MA  
03 155502  
SIMPSON, RW  
03 155462, 08 155468, 09 155664,  
10 155625  
SINCOFF, MZ  
03 155886  
SKINNER, R  
01 073886, 01 241534  
SKINNER, RE  
01 155495, 01 155716  
SLOCOMBE, AE  
06 155560  
SMETHERS, RG, JR  
06 155868  
SMITH, DG  
06 155874  
SMITH, WA  
03 260837  
SOKOLSKY, S  
03 155881  
SPAETH, RL  
03 155519

SPAULDING, JJ  
01 127819  
SPENCER, FW  
06 155491  
SPERRY, WC  
03 155931  
SPILSETH, G  
01 155534  
STAFFORD, PH  
01 225169, 08 073774  
STAMMERS, RB  
08 158235  
STANGAS, P  
01 147044  
STARLING, JD  
03 155813, 05 155862  
STEFFEN, M  
10 155850  
STEIN, KS  
02 155630  
STEITL, DC  
08 127693  
STEPANKI, JX  
07 155873  
STEPHENSON, RJ  
03 155557  
STEUART, GN  
08 155685  
STEVENSON, GM  
03 155550  
STICKLING, RW  
08 096281  
STOESS, RF  
08 155705  
STOREY, WC  
03 155944  
STRATFORD, AH  
03 155840  
STRECKENBACH, JM  
03 155943  
SUD, IK  
10 155887  
SULLIVAN, TM  
10 155909  
SUSSAN, NR  
03 091352  
SUTHERLAND, LC  
03 090347  
SUTTON, PJ  
08 155752  
SWEDISH, WJ  
08 155456  
SWEET, CP, JR  
09 131174

## T

TEGELER, AE  
08 155500  
THALER, D  
01 201790  
THEODORE, CA  
01 227950  
THIESSEN, GJ  
03 155938  
THOMAS, MK  
09 163510  
THOMPSON, GF  
02 155727, 04 155718  
THOMPSON, RE  
01 226654  
THOMSON, A  
03 155708  
TIGUE, J  
03 143952  
TILLIS, R  
01 155473  
TOPLIS, AF  
06 155865  
TOSIC, V  
08 155621

# Author Index

TRACY, SM  
08 200606  
TRAIN, RE  
03 155785  
TREIBEL, W  
03 155808, 06 155801  
TSCHANZ, JF  
03 155932  
TUAN, PL  
08 154739  
TUTTY, EB  
10 203784, 10 226655  
TYMCZYSYN, JP  
08 155478

## U

UNGER, VE  
02 159713  
UNGERER, JA  
03 240761

## V

VAN DER HORST, J  
09 155888  
VANLENNP, E  
03 155857  
VICKER, TK  
08 155606  
VICKERS, K  
08 155567  
VITTEK, JF  
03 155553  
VOGEL, AO  
03 155775  
VON GIERKE, HE  
03 154319  
VON LAUN, K  
02 155496  
VOSS, HW  
02 155526  
VULKAN, GH  
03 291036

## W

WAHL, MK  
08 163478  
WAITZMAN, SV  
10 152864  
WALLACE, DM  
04 155890  
WALTER, KB  
06 155910  
WANDERER, D  
05 143742  
WANEN, ML  
05 155454  
WANG, IT  
03 155935  
WARD, DE  
01 047566  
WARD, WP  
03 155936  
WARSKOW, MA  
08 073774  
WATERS, C  
03 155913  
WATERS, DM  
03 144429, 03 155819, 03 261122,  
03 261216  
WATKINS, L  
03 090348  
WATT, C  
10 148872  
WEIGAND, RM  
07 043646  
WEINBERG, MI  
01 155561  
WEINSTERN, AI  
08 155946  
WHEBY, FT  
06 155894

WHITBREAD, M  
06 155719  
WHITCOMB, MA  
03 094264  
WHITE, RT  
08 090395  
WHITEHEAD, KR  
04 155602  
WHITFORD, P  
05 155904  
WHITLOCK, EM  
01 051466, 01 051467, 01 155484,  
01 263929, 01 263930  
WIERSIG, DW  
01 147384, 01 155682  
WIERSTIG, DW  
01 152720  
WIGGERS, GF  
01 241459  
WILD, RH  
10 203787  
WILEY, JR  
10 155625  
WILLIAMSON, DG  
08 080174  
WILLIAMSON, JC  
01 265478  
WILLIAMSON, WR  
08 200606  
WILSON, N  
01 260792  
WIMSEY, JE  
06 163497  
WISCHMEYER, CE  
08 155476  
WLODYKA, R  
10 148872  
WOHL, M  
01 043911  
WOLF, P  
10 155919  
WOLPERT, J  
03 240691  
WOODSON, FB  
08 154306  
WORRALL, RD  
01 241433

## Y

YAGER, S  
10 260226  
YAJIMA, T  
02 155481  
YANEY, JC  
01 155564, 10 155458  
YATES, R  
03 155944  
YEN, A  
10 148872  
YOSHIOKA, AH  
03 155783  
YOUNG, CS  
06 155878  
YU, JC  
08 155753, 08 159710

## Z

ZANIEWSKI, J  
08 128751  
ZEITLIN, O  
03 155722  
ZIESENIS, CH  
08 155714



# RETRIEVAL TERM INDEX

## A

### ABSORPTION

03 155805

### ABSTRACTS

03 094165, 03 094172

### ACCELERATIONS

01 155533

### ACCEPTABILITY

06 158236

### ACCEPTABILITY CRITERIA/AIRCRAFT NOISE

03 155939

### ACCEPTANCE

08 155487, 08 155632

### ACCESS CONTROL

01 134030

### ACCESS ROADS

09 131162

### ACCESSIBILITY

01 039876, 01 073886, 01 073899, 01 241433, 06 155560, 09 131158,

09 163489, 10 155845

### ACCIDENT CAUSES

07 155593

### ACCIDENT INVESTIGATION

07 155593, 07 163500

### ACCIDENT STATISTICS

03 155605

### ACCOUNTING

02 155730

### ACCURACY

03 155784, 04 155450

### ACOUSTIC DATA

03 158238

### ACOUSTIC EQUIPMENT

03 155804

### ACOUSTIC INSULATION

03 239367

### ACOUSTIC MEASUREMENT

03 143153, 03 143345, 03 154396

### ACOUSTICS

03 155810, 03 155921, 03 158221, 10 155807

### ACOUSTICS/AIRCRAFT NOISE

03 155805, 03 155943

### ACTIVITIES

04 155452

### ADHESION

08 155764, 08 207518

### ADHESIVES

03 155790

### ADVANCED AIR TRAFFIC MANAGEMENT SYSTEM

08 080277

### AERODYNAMICS

08 155710

### AERONAUTICAL SATELLITES

08 155471

### AESTHETICS

10 155845

### AIR CARGO

01 135405, 07 155585, 07 155591, 08 144312

### AIR CARRIERS

01 155677, 01 155716, 02 155480, 02 159574, 03 240761, 04 155602,

04 155650, 04 163514, 04 163521, 08 092175, 08 137276, 08 155649,

08 200606, 09 155620, 10 155924

### AIR CONDITIONING

08 155809, 10 155807

### AIR CORRIDORS

04 147239

### AIR CURTAIN

08 155750

### AIR CUSHION

08 163486

### AIR FORCE OPERATIONS

03 155771

### AIR NAVIGATION

06 155815

### AIR POLLUTION

02 155523, 03 143952, 03 155742, 03 155813, 03 155840, 03 155861,

03 155883, 03 155932, 03 155933, 03 155935, 03 226630, 04 143864,

05 155694, 06 155860, 06 155865, 06 155878, 08 155713

### AIR ROUTE TRAFFIC CONTROL CENTER

04 154732

### AIR ROUTES

08 090717

### AIR SERVICE ACCESS

01 260792

### AIR SPACE

06 131161, 08 155547

### AIR TAXI

08 137276

### AIR TRAFFIC

01 202048, 02 155630, 03 090348, 03 143345, 03 144322, 03 155742,

03 155881, 04 092261, 04 150763, 04 155662, 04 158214, 08 146689,

08 150853, 08 155627, 08 155632, 08 155654

# Retrieval Term Index

## AIR TRAFFIC CONTROL

01 241455, 05 155770, 06 129627, 08 050141, 08 054427, 08 073974,  
08 075265, 08 080277, 08 090717, 08 093584, 08 093888, 08 094531,  
08 137276, 08 150853, 08 154295, 08 154296, 08 154306, 08 154336,  
08 154355, 08 154726, 08 154739, 08 155460, 08 155471, 08 155476,  
08 155478, 08 155479, 08 155493, 08 155499, 08 155500, 08 155516,  
08 155517, 08 155532, 08 155547, 08 155558, 08 155559, 08 155621,  
08 155643, 08 155648, 08 155681, 08 155700, 08 155713, 08 155817,  
08 158222, 08 158224, 08 158235, 08 163531, 08 163533, 01 155903

## AIR TRAFFIC CONTROL RADAR BEACON SYSTEM

08 094531, 08 154296

## AIR TRAFFIC CONTROL SYSTEM ANALYSIS

04 147239

## AIR TRAFFIC CONTROLLERS

08 090395, 08 094531, 08 094537, 08 154336, 08 155486, 08 155500,  
08 155559, 08 158235

## AIR TRAFFIC FORECASTS

01 155484, 03 155861, 04 155452, 04 155566, 04 155602, 04 155901,  
04 155908, 04 163484, 04 291008, 06 155838, 08 144312, 08 144313,  
08 155898

## AIR TRAFFIC MANAGEMENT AND CONTROL

08 155460

## AIR TRANSPORTATION

01 135405, 01 155556, 01 200156, 01 241383, 01 263930, 02 155635,  
02 155751, 02 155816, 03 155521, 03 155644, 03 155766, 03 155790,  
03 155792, 03 155931, 03 261047, 04 143864, 04 155718, 04 155891,  
04 155897, 04 158216, 06 146652, 06 158215, 06 158217, 08 155503,  
08 155669, 10 155571

## AIRBAGS

05 155844

## AIRCRAFT

01 242117, 02 155725, 03 143952, 03 144429, 03 155933, 04 155545,  
04 155602, 05 155747, 05 155844, 07 155591, 07 155593, 08 073974,  
08 080640, 08 155474, 08 155476, 08 155505, 08 155543, 08 155595,  
08 155649, 08 155666, 08 155711, 08 163478, 08 202302, 08 203781,  
09 131177, 09 163483, 10 152864, 10 155578, 10 155882, 10 203784

## AIRCRAFT ACCIDENTS

07 155593, 07 163477, 07 163492, 07 163493, 07 163500, 07 163537,  
08 163486, 08 163533

## AIRCRAFT ANTENNAS

02 155724

## AIRCRAFT DESIGN

02 155724, 03 155767, 03 155917, 03 155931, 07 163477, 07 163479,  
10 152864

## AIRCRAFT ENGINE NOISE

03 091196, 03 091197

## AIRCRAFT ENGINES

03 155644, 03 155917, 03 158239

## AIRCRAFT EXHAUST

08 155750

## AIRCRAFT FLEET MIX

03 090348

## AIRCRAFT FUELS

03 155742, 05 155759, 08 163485, 08 163490, 08 163499, 08 163526,  
08 163527

## AIRCRAFT GUIDANCE

08 155516

## AIRCRAFT LANDINGS

02 155724, 03 137104, 03 155795, 07 163498, 08 092377, 08 150729,  
08 154355, 08 155487, 08 155649, 08 158222, 08 163511, 08 163539

## AIRCRAFT MAINTENANCE

07 155593

## AIRCRAFT MANEUVERS

03 093837, 10 203784

## AIRCRAFT NOISE

01 155721, 03 090347, 03 093653, 03 093811, 03 093837, 03 094165,  
03 094172, 03 094264, 03 094296, 03 094548, 03 137104, 03 143153,  
03 143814, 03 144322, 03 145844, 03 154083, 03 154319, 03 154741,  
03 155502, 03 155512, 03 155518, 03 155521, 03 155553, 03 155589,  
03 155610, 03 155612, 03 155708, 03 155722, 03 155723, 03 155767,  
03 155773, 03 155776, 03 155780, 03 155781, 03 155783, 03 155787,  
03 155795, 03 155808, 03 155812, 03 155863, 03 155905, 03 155913,  
03 155914, 03 155917, 03 155926, 03 155928, 03 155929, 03 155940,  
03 155941, 03 155942, 03 155944, 03 158221, 03 158238, 03 163480,  
03 223470, 03 223857, 03 224129, 03 224654, 03 239367, 03 239973,  
03 240761, 03 261047, 03 261050, 03 261122, 03 261131, 03 261137,  
03 261149, 03 261233, 03 261278, 03 261399, 03 291036, 04 143864,  
04 147239, 05 132286, 05 145882, 05 147030, 05 155513, 05 155609,  
05 155769, 05 155770, 05 155791, 07 155593, 08 144312, 08 155710

## AIRCRAFT NOISE/ANNOYANCE

03 093724, 03 094469, 03 137104, 03 137194, 03 143124, 03 154083,

03 155743, 03 155766, 03 155789, 03 155804, 03 155913, 03 155920,  
03 155928, 03 155942, 03 246207, 03 261122, 03 261216

## AIRCRAFT NOISE/CERTIFICATION

03 261050

## AIRCRAFT NOISE/COMMUNITY NOISE

03 091196, 03 091197, 03 091198, 03 155772, 03 155943

## AIRCRAFT NOISE/COMMUNITY REACTION

03 075396, 03 155462, 03 155501, 03 155507, 03 155520, 03 155524,  
03 155557, 03 155616, 03 155768, 03 155771, 03 155774, 03 155777,  
03 155786, 03 155789, 03 155790, 03 155804, 03 155819, 03 155820,  
03 155829, 03 155936, 03 261048, 05 155608, 08 080174

## AIRCRAFT NOISE/FEDERAL REGULATIONS

03 223857, 03 261149

## AIRCRAFT NOISE/LEGISLATION

03 260837, 03 261041

## AIRCRAFT NOISE/PROPERTY VALUES

03 155617

## AIRCRAFT NOISE/SUBJECTIVE RATINGS

03 261289

## AIRCRAFT OPERATIONS

02 155630, 03 143124, 03 155742, 03 155779, 03 155804, 03 155810,  
03 155829, 03 155881, 03 155914, 03 155917, 03 155931, 03 155940,  
04 163521, 04 240712, 06 155874, 07 163479, 07 163492, 08 137276,  
08 155486, 08 260232, 04 155871

## AIRCRAFT PERFORMANCE

03 155861, 08 155456

## AIRCRAFT PILOTS

07 155593, 07 163493, 08 155559

## AIRCRAFT SAFETY

03 155605, 07 163507, 08 080277

## AIRCRAFT SEPARATION

08 155486, 08 155487

## AIRCRAFT SOUND DESCRIPTION SYSTEM

03 155778

## AIRCRAFT TIRES

08 163478

## AIRFIELD PERFORMANCE

08 090395

## AIRLINE OPERATIONS

04 155545, 04 155890

## AIRLINES

01 155843, 02 152874, 02 155732, 02 155798, 02 155816, 03 155553,  
03 155612, 03 155708, 03 155803, 03 155914, 05 155726, 07 155591,  
07 155593, 08 155543, 08 155669, 08 163490, 08 260232, 10 155580,  
10 155592, 10 155749, 10 155924, 10 155927, 10 203792

## AIRPORT ACCESS

01 041878, 01 043627, 01 043911, 01 044065, 01 044205, 01 044206,  
01 046998, 01 047566, 01 051326, 01 051438, 01 051466, 01 051467,  
01 051555, 01 054550, 01 072047, 01 073886, 01 073899, 01 080637,  
01 097723, 01 099521, 01 131261, 01 135405, 01 147044, 01 147384,  
01 152720, 01 155463, 01 155464, 01 155465, 01 155477, 01 155482,  
01 155483, 01 155484, 01 155492, 01 155495, 01 155531, 01 155533,  
01 155534, 01 155541, 01 155548, 01 155549, 01 155556, 01 155561,  
01 155564, 01 155588, 01 155597, 01 155611, 01 155613, 01 155629,  
01 155638, 01 155655, 01 155656, 01 155661, 01 155674, 01 155677,  
01 155680, 01 155682, 01 155687, 01 155697, 01 155698, 01 155716,  
01 155721, 01 155760, 01 155761, 01 155762, 01 155830, 01 155843,  
01 155903, 01 155911, 01 200156, 01 201742, 01 201790, 01 202048,  
01 202301, 01 202532, 01 226761, 01 227950, 01 228030, 01 228292,  
01 228529, 01 239535, 01 239614, 01 241383, 01 241455, 01 241456,  
01 241457, 01 241458, 01 241459, 01 241460, 01 241534, 01 241559,  
01 241925, 01 241963, 01 242100, 01 242101, 01 242110, 01 242111,  
01 242117, 01 242342, 01 242449, 01 242534, 01 242561, 01 242579,  
01 260186, 01 260792, 01 263929, 01 263930, 01 265475, 01 265478,  
02 155678, 03 155568, 03 155813, 04 136851, 04 139614, 04 155535,  
04 155662, 04 163514, 04 163522, 04 291008, 05 155467, 06 131161,  
06 155842, 06 155860, 06 155868, 06 155876, 06 155896, 06 155910,  
06 158217, 06 158236, 06 227275, 08 155547, 08 155558, 08 155654,  
08 155851, 08 155907, 09 131164, 09 155586, 09 155601, 09 163504,  
10 155807, 10 155836, 10 155925, 10 203787, 10 226655, 10 260226

## AIRPORT AND AIRWAY DEVELOPMENT ACT

02 163487

## AIRPORT AND AIRWAY TRUST FUND

02 155494, 02 163535

## AIRPORT CAPACITY

01 047566, 01 073899, 02 155508, 02 155670, 02 155675, 02 155732,  
02 155751, 04 155451, 04 155650, 04 291008, 05 155467, 05 155694,  
05 155904, 06 131161, 06 155491, 06 155712, 06 155842, 06 155874,  
06 203778, 08 073774, 08 074073, 08 080277, 08 093584, 08 128751,

# Retrieval Term Index

08 144312, 08 155499, 08 155503, 08 155505, 08 155516, 08 155517,  
08 155558, 08 155567, 08 155599, 08 155685, 08 155753, 08 155817,  
08 155898, 08 155947, 08 159710, 08 203781, 08 203791, 08 203798,  
09 131164, 10 155571, 10 155652, 10 155706, 10 155807, 10 203788

## AIRPORT CONGESTION

01 155534, 01 155613, 01 202048, 01 226761, 01 226911, 01 239614,  
02 155480, 02 155523, 02 155630, 02 155651, 02 155670, 02 155672,  
02 155732, 06 144324, 08 155479, 08 155503, 08 155627, 08 155632,  
08 155649, 08 155669, 08 200606, 08 202302, 09 131163, 10 155625

## AIRPORT CONSTRUCTION

05 155832

## AIRPORT CONTROL TOWERS

05 090320, 05 143742, 08 094531, 08 094538, 08 137276

## AIRPORT DEMAND AND FORECAST

04 092261, 04 155745, 04 163514, 04 163521, 04 163522  
04 163523, 05 159714

## AIRPORT DESIGN

01 155721, 01 223420, 01 226654, 01 241383, 02 155823, 02 155889,  
03 155512, 03 155568, 03 155813, 03 155861, 03 155931, 04 155566,  
04 155745, 04 155871, 04 155897, 05 155862, 06 129627, 06 131161,  
06 144324, 06 144325, 06 155455, 06 155491, 06 155546, 06 155695,  
06 155707, 06 155712, 06 155720, 06 155802, 06 155806, 06 155838,  
06 155858, 06 155860, 06 155865, 06 155866, 06 155868, 06 155874,  
06 155876, 06 155877, 06 155878, 06 155884, 06 155894, 06 155896,  
06 155910, 06 155912, 06 158236, 07 163479, 08 073774, 08 144312,  
08 144313, 08 155478, 08 155514, 08 155547, 08 155573, 08 155577,  
08 155633, 08 155645, 08 155658, 08 155665, 08 155666, 08 155704,  
08 155705, 08 155713, 08 155714, 08 155717, 08 155750, 08 155809,  
08 155834, 08 155839, 08 155851, 08 155892, 08 155898, 08 155907,  
10 073884, 10 131176, 10 155537, 10 155578, 10 155580, 10 155604,  
10 155637, 10 155683, 10 155684, 10 155703, 10 155706, 10 155748,  
10 155749, 10 155807, 10 155845, 10 155850, 10 155882, 10 155916,  
10 155919, 10 155924, 10 155927, 10 159711

## AIRPORT DEVELOPMENT

02 155798, 02 155822, 02 155823, 02 155824, 02 155825, 02 155859,  
02 155906, 03 155766, 03 155913, 04 155890, 04 155897, 04 155901,  
08 155851

## AIRPORT ECONOMICS AND FINANCE

02 155651, 02 155730, 02 163487, 02 163488, 02 163491, 02 163508,  
02 163509, 02 163535, 05 155746

## AIRPORT ENVIRONMENTAL IMPACT

02 155494, 02 155670, 03 075396, 03 144322, 03 154083, 03 154319,  
03 154396, 03 154741, 03 155462, 03 155501, 03 155502, 03 155507,  
03 155511, 03 155512, 03 155518, 03 155519, 03 155520, 03 155521,  
03 155522, 03 155524, 03 155550, 03 155553, 03 155557, 03 155568,  
03 155589, 03 155605, 03 155607, 03 155610, 03 155612, 03 155616,  
03 155617, 03 155618, 03 155644, 03 155659, 03 155668, 03 155708,  
03 155722, 03 155723, 03 155728, 03 155742, 03 155743, 03 155744,  
03 155766, 03 155767, 03 155768, 03 155771, 03 155772, 03 155773,  
03 155774, 03 155775, 03 155776, 03 155777, 03 155778, 03 155779,  
03 155780, 03 155781, 03 155783, 03 155784, 03 155785, 03 155786,  
03 155787, 03 155789, 03 155790, 03 155792, 03 155793, 03 155795,  
03 155803, 03 155804, 03 155805, 03 155808, 03 155810, 03 155812,  
03 155813, 03 155814, 03 155819, 03 155820, 03 155827, 03 155829,  
03 155835, 03 155840, 03 155854, 03 155857, 03 155863, 03 155881,  
03 155883, 03 155886, 03 155893, 03 155905, 03 155913, 03 155914,  
03 155917, 03 155920, 03 155921, 03 155926, 03 155928, 03 155929,  
03 155930, 03 155931, 03 155932, 03 155933, 03 155934, 03 155935,  
03 155936, 03 155938, 03 155939, 03 155940, 03 155941, 03 155942,  
03 155943, 03 155944, 03 158221, 03 158238, 03 158239, 03 163480,  
03 261047, 04 090622, 04 155662, 05 155454, 05 155513, 05 155608,  
05 155609, 05 155694, 05 155769, 05 155770, 05 155791, 05 163532,  
06 155719, 06 155794, 06 155884, 08 144312, 08 155547

## AIRPORT FINANCE

02 155496, 02 155508, 02 155526, 02 155527, 02 155600, 02 155630,  
02 155667, 02 155671, 02 155672, 02 155673, 02 155675, 02 155677,  
02 155689, 02 155715, 02 155724, 02 155725, 02 155727, 02 155731,  
02 155732, 02 155733, 02 155734, 02 155735, 02 155736, 02 155737,  
02 155798, 02 155822, 02 155823, 02 155824, 02 155825, 02 155859,  
02 159574, 03 155512, 05 155509, 08 155669

## AIRPORT FORECASTS

04 154732, 04 155574, 04 155602, 04 155650, 04 155718, 04 155833,  
04 155879, 04 155890, 04 155891, 04 155901, 04 155908, 04 159709,  
04 163484

## AIRPORT LIMOUSINE

01 073886, 01 241534

## AIRPORT LOCATION

01 155464, 01 155613, 01 155674, 01 155903, 01 241460, 02 155671,  
02 159713, 02 163508, 03 155522, 03 155524, 03 155557, 03 155668,  
03 155777, 03 155857, 03 155863, 03 228038, 03 240691, 03 240791,

03 261149, 04 155662, 04 158214, 05 155758, 06 155695, 06 155712,  
06 155720, 06 155806, 06 155896, 08 144312, 08 155907

## AIRPORT MANAGEMENT

01 155761, 01 263930, 02 155730, 05 099284, 05 155467, 05 155509,  
05 155542, 05 155679, 05 155746, 05 155747, 05 155758, 05 155759,  
05 155821, 05 155844, 05 155849, 05 155862, 05 155872, 05 155904,  
06 155491, 06 155815, 07 155554, 08 155479, 08 155852, 08 155946,  
09 155888, 09 163483, 10 155634

## AIRPORT MANAGEMENT, REGULATION, AND POLICY

08 163485, 08 163524, 08 163526

## AIRPORT MODELS

03 143952

## AIRPORT NOISE

01 155613, 01 155903, 02 155523, 02 155670, 02 155673, 03 075504,  
03 090347, 03 094264, 03 094548, 03 133135, 03 143176, 03 145844,  
03 155507, 03 155511, 03 155512, 03 155519, 03 155520, 03 155617,  
03 155659, 03 155708, 03 155723, 03 155728, 03 155766, 03 155767,  
03 155774, 03 155775, 03 155778, 03 155786, 03 155803, 03 155810,  
03 155812, 03 155813, 03 155819, 03 155820, 03 155827, 03 155840,  
03 155857, 03 155930, 03 155937, 03 155944, 03 223470, 03 239367,  
03 240761, 03 261047, 03 261399, 03 291036, 04 090622, 05 145882,  
05 147030, 05 155454, 05 155791, 06 158217, 08 155907

## AIRPORT NOISE/COMMUNITY DISTURBANCE

03 090348, 03 091196, 03 093811, 03 094469, 03 137194, 03 155518,  
03 155519, 03 155644, 03 155779, 03 155785, 03 155854, 03 201520,  
03 224654, 08 155516

## AIRPORT NOISE/COMMUNITY REACTION

03 155553, 03 155612

## AIRPORT OPERATIONS

01 155561, 01 155613, 01 155903, 01 226654, 01 239614, 01 242117,  
02 131159, 02 155496, 02 155689, 02 155724, 02 155725, 02 155727,  
02 155734, 02 163535, 03 144429, 03 155521, 03 155612, 03 155784,  
03 155840, 03 155883, 03 226630, 04 155745, 05 131166, 05 155454,  
05 155608, 05 155679, 05 155694, 05 155747, 05 155758, 05 155770,  
05 155872, 05 163530, 05 200576, 06 131161, 06 155569, 06 155707,  
06 155719, 06 155842, 06 158217, 06 163497, 07 163503, 08 080174,  
08 094536, 08 155499, 08 155503, 08 155547, 08 155685, 08 155714,  
08 155717, 08 155752, 08 155839, 08 155898, 08 159710, 08 200606,  
08 202302, 08 203798, 08 260232, 09 131154, 09 131162, 09 131165,  
09 131168, 09 131172, 09 131173, 09 131177, 09 155664, 09 163510,  
10 155579, 10 155580, 10 155634, 10 155683, 10 155927, 10 203792

## AIRPORT PAVEMENTS

06 147285

## AIRPORT PLANNING

01 155463, 01 155531, 01 155561, 01 155588, 01 155613, 01 155687,  
01 239614, 01 242117, 02 155496, 02 155672, 02 155823, 02 159713,  
02 163508, 03 091198, 03 144322, 03 155518, 03 155522, 03 155568,  
03 155618, 03 155708, 03 155742, 03 155744, 03 155783, 03 155786,  
03 155813, 03 155814, 03 155835, 03 155840, 03 155863, 04 139614,  
04 155450, 04 155451, 04 155574, 04 155745, 04 155833, 04 155891,  
04 155897, 04 155901, 04 163484, 05 155679, 05 155862, 05 155872,  
05 200576, 06 129627, 06 131161, 06 143009, 06 151572, 06 155455,  
06 155491, 06 155695, 06 155719, 06 155794, 06 155801, 06 155815,  
06 155842, 06 155846, 06 155858, 06 155874, 06 155876, 06 155877,  
06 155878, 06 155894, 06 155896, 06 155910, 06 155912, 06 158217,  
06 158236, 06 227275, 07 155755, 07 155873, 08 144312, 08 155547,  
08 155573, 08 155577, 08 155645, 08 155658, 08 155681, 08 155704,  
08 155713, 08 155717, 08 155831, 08 155834, 08 155839, 08 155892,  
08 155898, 08 155907, 08 159710, 09 131157, 09 131158, 09 131163,  
09 131167, 09 131173, 09 163510, 09 226289, 10 093463, 10 127692,  
10 155562, 10 155570, 10 155571, 10 155634, 10 155683, 10 155684,  
10 155701, 10 155748, 10 155749, 10 155836, 10 155845, 10 155850,  
10 155882, 10 155909, 10 155925, 10 159711, 10 163476, 10 242448

## AIRPORT PLANNING AND DESIGN

06 163497, 07 163513, 09 163505, 10 163495

## AIRPORT RUNWAYS

02 155678, 03 155612, 03 155616, 03 155805, 03 155921, 04 155908,  
04 159709, 04 291008, 05 155454, 05 155679, 05 155849, 06 147285,  
06 155806, 06 155846, 06 155896, 06 155910, 07 163498, 08 074073,  
08 075265, 08 090717, 08 155621, 08 155700, 08 155851, 08 155945,  
08 163478, 08 163524

## AIRPORT SAFETY

03 155605, 05 155872, 07 155593, 07 155848, 07 155873, 07 163477,  
07 163479, 08 155945, 08 163478, 09 158220

## AIRPORT SAFETY AND SECURITY

05 163530, 07 155489, 07 155741, 07 163492, 07 163493, 07 163498,  
07 163500, 07 163503, 07 163506, 07 163507, 07 163516, 07 163525,  
07 163537, 08 163511, 08 163533

## AIRPORT SECURITY

07 155585, 07 155591, 07 155755



# Retrieval Term Index

## AIRPORT STATISTICS

04 155729, 04 158214

## AIRPORT SURFACE DETECTION EQUIPMENT

08 094537, 08 155595

## AIRPORT SURFACE TRAFFIC CONTROL

01 155463, 08 054427, 08 092175, 08 093888, 08 094531, 08 094536,  
08 094537, 08 094538, 08 155471, 08 155514, 08 155547, 08 155558,  
08 155595, 08 155596, 08 155867

## AIRPORT SURVEILLANCE RADAR

08 154296

## AIRPORTS

01 073875, 01 073899, 01 134030, 01 147044, 01 147384, 01 152720,  
01 155473, 01 155497, 01 155541, 01 155561, 01 155588, 01 202532,  
01 225169, 01 226285, 01 241332, 01 241433, 01 241699, 01 242117,  
01 260792, 02 152874, 02 155526, 02 155527, 02 155600, 02 155615,  
02 155673, 02 155675, 02 155696, 02 159574, 03 093653, 03 136670,  
03 143345, 03 143814, 03 145844, 03 155618, 04 150763, 04 155453,  
04 155545, 05 084118, 05 155726, 05 155821, 06 080796, 06 080981,  
06 129627, 06 143761, 06 145845, 06 146652, 06 147285, 06 155546,  
06 155569, 07 127284, 07 155554, 08 094536, 08 143307, 08 146689,  
08 147279, 08 150729, 08 150853, 08 155456, 08 155479, 08 155577,  
08 155711, 09 131174, 10 073882, 10 073897, 10 144428, 10 152864,  
10 152865, 10 155539, 10 155701, 10 203787, 10 260226

## AIRSIDE CAPACITY

01 241559, 04 090888, 04 155871, 04 291008, 05 131166, 06 130428,  
06 155707, 06 155838, 08 074073, 08 090395, 08 092175, 08 093584,  
08 093888, 08 094531, 08 094536, 08 094537, 08 094538, 08 128751,  
08 131171, 08 143307, 08 154310, 08 155486, 08 155503, 08 155505,  
08 155543, 08 155558, 08 155595, 08 155596, 08 155627, 08 155632,  
08 155639, 08 155649, 08 155654, 08 155658, 08 155669, 08 155681,  
08 155685, 08 155700, 08 155831, 08 155834, 08 155851, 08 155867,  
08 155895, 08 155947, 08 163482, 08 163486, 08 260232, 09 131154,  
09 131172, 09 131174, 10 093463, 10 155570, 10 155837

## AIRSIDE DESIGN AND OPERATIONS

06 163536, 08 163499, 08 163502, 08 163527, 08 163531, 08 163534,  
08 163538, 08 163539, 08 163540

## AIRSPACE

06 155569, 06 155815, 08 155639, 08 155817

## AIRTRANS

10 148872

## AIRWAYS

02 159574, 05 155821

## ALGORITHMS

03 143124, 03 155771, 03 155935, 10 155539, 10 155887

10 127692

## ALIGNMENT

01 155655

## ALL-WEATHER AVIATION

08 155516, 08 155654

## ALLOCATIONS

02 155725

## ALTERNATIVES

01 155597, 01 155661, 01 155687, 03 228038, 06 145845

## ALTITUDE

03 136661, 03 155772, 03 155933, 08 155474

## ALUMINUM

03 155934

## AMPHIBIOUS AIRCRAFT

06 155868

## AMPLIFIERS

10 163495

## AMPLITUDE

08 127693

## ANALOG SYSTEMS

03 155790, 08 163478

## ANALOG TO DIGITAL CONVERTERS

08 151570

## ANALYTICAL METHODS

02 155715, 03 155930, 06 155878, 09 155664, 10 155882

## ANCHORAGE INTERNATIONAL AIRPORT

03 155659

## ANTENNA

08 158224

## APPROACH

03 137104, 03 143153, 03 155779, 03 155940, 06 155866, 08 154355,  
08 155486, 08 155516, 08 155621, 08 155945, 03 137194

## APPROACH CONTROL

08 080277

## APPROACH LIGHTS

08 163482

## APRONS

02 155678, 06 155707, 08 155714, 08 155834, 08 155839, 08 155851,  
08 155895, 08 163531, 10 203784  
05 155849, 06 131161, 08 155505, 09 131172, 10 093463, 10 127692,  
10 155539

## ARCHITECTURE

06 144324, 06 144325, 08 155547, 10 152864, 10 152865, 10 155604,  
10 155703, 10 155706

## AREA NAVIGATION

08 154306, 08 155471

## ARIZONA REGIONAL AIRPORT

06 155876

## ARLANDA-STOCKHOLM AIRPORT/SWEDEN

03 155941, 08 163517

## ARRIVALS

10 155641

## ARRIVALS AND DEPARTURES

01 155682, 01 155761, 03 155774, 03 155835, 03 155854, 03 155861,  
04 155871, 08 080277, 08 155486, 08 155558, 08 155632, 10 155539,  
10 155807

## ASPHALT PAVEMENT

08 155752

## ASSESSMENT

03 143153, 03 155668, 03 155819, 03 155840, 08 155532

## ASSIGNMENTS

01 047566

## ASYMMETRY

01 241534

## ATMOSPHERIC DISPERSION

03 155883

## ATTENUATION

03 155861

## ATTITUDES/MENTAL

10 155836

## AUTOMATED DISPATCHING

10 155841

## AUTOMATED GUIDEWAY TRANSIT

10 155757

## AUTOMATED TRANSIT SYSTEM

01 127819, 01 132054, 01 155624, 01 155880, 01 223420, 01 241332,  
01 241559, 01 265478, 06 155896, 09 163529, 10 148872, 10 155510,  
10 155841, 10 155916

## AUTOMATIC CONTROL

10 155590

## AUTOMATIC TRAIN OPERATIONS

09 155586

## AUTOMATION

01 226285, 01 226911, 05 155904, 08 090717, 08 094531, 08 155460,  
08 155471, 08 155648, 08 163534, 10 155647, 10 155909, 10 155918,  
10 158218

## AUTOMOBILES

01 051467, 01 097723, 01 152720, 01 155495, 01 155528, 01 155556,  
01 155677, 01 201790, 03 154396, 06 227275, 09 131157, 10 155604

## AVIATION

03 155893

## AVIATION SAFETY

08 050141, 08 155867

## AXIAL FLOW FANS

08 155750

## B

## BACKGROUND RADIATION

08 151570

## BAGGAGE

07 094542, 07 155489, 07 155591, 08 155543, 10 073882, 10 073884,  
10 073897, 10 155537

## BAGGAGE CARS

10 155811

## BAGGAGE HANDLING

01 051467, 01 155656, 01 226654, 01 241455, 02 155724, 04 155897,  
05 155747, 06 155707, 08 155809, 08 155852, 09 131177, 10 073884,  
10 155580, 10 155590, 10 155592, 10 155622, 10 155641, 10 155647,  
10 155652, 10 155807, 10 155882, 10 155909, 10 155918, 10 155925,  
10 158218, 10 158219, 10 203784, 10 203787, 10 226655, 10 260226

## BAGGAGE TERMINALS

08 155750

# Retrieval Term Index

## BAHRAIN AIRPORT

08 155852

## BALLISTIC TESTING

07 163537

## BALTIMORE WASHINGTON INTERNATIONAL AIRPORT

01 155549, 06 144324

## BARIUM

03 155924

## BAY AREA RAPID TRANSIT

01 041878, 01 043627, 01 155548, 01 242100, 01 046998, 01 155680

## BEACON LIGHTS

08 163539

## BEFORE AND AFTER STUDIES

01 228030, 03 155920

## BEHAVIOR

01 155495, 01 155564, 10 155836, 07 163525, 10 155571

## BELGRADE AIRPORT/YUGOSLAVIA

03 155781

## BENEFIT COST ANALYSIS

02 155523, 02 155671, 02 159574, 03 155524, 05 155467, 08 155532, 08 155536, 08 155595

## BENEFITS

02 155675, 02 155715, 02 155735, 02 163491, 03 155744, 05 155726, 08 155632

## BERLIN-TEGEL AIRPORT/WEST GERMANY

09 158220

## BERMS

03 155805

## BIBLIOGRAPHY

01 202048, 02 155523, 03 075396, 03 093837, 03 143814, 04 155566, 04 158216, 07 155554

## BIOASSAY

09 163483

## BIOLOGICAL EFFECTS

03 093837

## BIRDS

07 163493, 08 155665, 08 155851, 08 163533

## BLACK POWDER

07 094542

## BLOCKTIME

08 155478

## BOEING 747 AIRCRAFT

10 155807

## BOMBS

07 155591

## BONDS

02 155526, 02 155600, 02 155731, 02 155734, 02 155737, 02 163508

## BOTTLENECKS

08 163515

## BOUNDARY LAYER

03 155814

## BRADLEY INTERNATIONAL AIRPORT/CONNECTICUT

01 127819, 01 132054

## BRAKING

08 155606

## BRAKING DISTANCE

08 163478

## BUDGET

02 155730, 04 154732

## BUILDINGS

03 093837

## BUS RAPID TRANSIT

01 241383

## BUS TERMINAL

01 241433

## BUS TRANSPORTATION

01 044065, 01 051467, 01 097723, 01 155556, 01 155661, 01 201790, 01 241455, 01 241456, 01 242110, 01 242342, 04 155662

## BUSES

10 155604

## BUSINESS ORGANIZATIONS

05 155726

## BUSINESS TRIPS

04 155729

## BY-PASS

10 155841

## CALIBRATIONS

01 073886, 01 155716, 03 158238, 08 155632

## CAPACITY

01 073899, 08 073774, 08 074073, 08 155468, 10 155504, 10 155748

## CAPE KENNEDY AIRPORT

05 155609

## CAPITAL EXPENDITURES

01 043911, 02 055730

## CAPITAL IMPROVEMENTS

05 155609, 05 200576

## CAPITAL INVESTMENT

02 155496, 02 155725, 05 155509, 08 163490

## CAR PARK

09 163528

## CARBON DIOXIDE

07 155848

## CARBON MONOXIDE

03 226630

## CARDS

10 159712

## CARGO

04 150763, 04 155745, 07 155489, 10 073882

## CARGO AIRCRAFT

04 092261

## CARGO FACILITIES

08 163515

## CARGO HANDLING

05 155849, 06 130428, 06 155515, 06 155806, 06 155846, 09 131162, 10 155584, 10 155590, 10 155882, 10 203784, 10 226655

## CARGO MOVEMENTS

01 155533

## CARPOOLS

01 155738

## CASE STUDIES

01 155482, 03 155618, 03 261041

## CAUSAL ANALYSIS

03 155928

## CENTER LINE

08 155752, 08 155945

## CENTERLINE SPACING

08 080276, 08 155567

## CENTRAL BUSINESS DISTRICT

01 044065, 01 044205, 01 044206, 01 051438, 01 080637, 01 155533, 01 155588, 01 155661, 01 241457, 01 241458, 01 241460, 01 242579, 01 265475, 03 155723, 06 155860, 08 155536

## CERTIFICATION

03 155512, 07 163503

## CERTIFICATION/AIRCRAFT NOISE

03 155644

## CHARLES DE GAULLE AIRPORT/PARIS

03 155803, 06 155896, 10 155510, 10 155748

## CHARTERING

02 155667, 04 163521

## CHEMICALS

03 155883, 09 163510

## CHLORINATED RUBBER

08 155764

## CHOICE

01 155716

## CINCINNATI REGIONAL AIRPORT

09 163494

## CIRCULATION

10 155836

## CITIZEN PARTICIPATION

03 155790, 03 155813, 03 155829

## CITY STREETS

03 155921

## CIVIL AERONAUTICS BOARD

08 155681

## CIVIL AVIATION

03 090347, 03 143345

## CIVIL ENGINEERING

06 155546

## CLASSIFICATION

01 155911, 03 155778, 05 090320, 06 155842

# Retrieval Term Index

## CLEAN AIR ACT

03 155742

## CLEARANCE

08 155493

## CLEVELAND HOPKINS INTERNATIONAL AIRPORT

01 043911, 01 044065, 01 044205, 01 044206, 01 228030, 01 228292,  
01 241459, 01 260792, 06 144325, 08 057000

## CLOSED CIRCUIT TELEVISION

01 158240, 07 155741, 10 155841

## COALESCERS

08 163499

## COCKPIT

08 094537

## COINTAIN AIRPORT/SWITZERLAND

09 163528

## COLLISION AVOIDANCE

08 155471

## COLOR

08 207518

## COMBUSTION

03 158239

## COMFORT

08 155573

## COMMERCIAL AVIATION

03 094548, 03 155827, 08 146689

## COMMUNICATION SYSTEMS

07 155554, 08 155500, 10 155579, 10 155841

## COMMUNITIES

02 155481, 03 155744, 03 155783, 03 155810, 03 155893, 03 155929,  
03 155931, 06 155860, 08 080175, 08 080176, 08 155536

## COMMUNITY CONSEQUENCES

06 155695

## COMMUNITY COOPERATION

10 155749

## COMMUNITY DEVELOPMENT

04 143864, 05 159714, 06 143761

## COMMUNITY IMPACT

06 155838

## COMMUNITY NOISE

03 155767, 03 261278

## COMMUNITY NOISE/AIRCRAFT NOISE

03 136661

## COMMUNITY REACTIONS

03 240691, 03 240791, 04 240712

## COMMUNITY SUPPORT

03 155668, 03 155804

## COMMUNITY VALUES

03 155605, 03 155793, 03 155914

## COMMUTER AIRLINES

04 155535, 04 163514, 04 163521, 05 159714, 06 146652

## COMMUTER TRANSPORTATION

01 241963, 08 155536

## COMPARATIVE ANALYSIS

02 155824

## COMPARISONS

02 155735

## COMPENSATION

03 155518, 03 155617, 03 201520

## COMPENSATORS/ELECTROMECHANICAL

08 163517, 09 155888

## COMPETITION

05 155467, 08 155681

## COMPLIANCE

07 163516

## COMPLIANCE TEST

03 155644

## COMPOSITE CONSTRUCTION

09 163504

## COMPOSITE NOISE RATING

03 155778, 03 155789

## COMPREHENSIVE PLANNING

03 155618

## COMPUTATIONS

08 155831

## COMPUTER APPLICATIONS

01 158240, 03 143124, 03 155790, 03 240207, 04 155879, 05 155542,  
08 147279, 08 155479, 08 155714, 08 155817, 08 158235, 08 163512

## COMPUTER CONTROLLED SYSTEMS

01 127819, 01 155497, 01 226911, 04 155662

## COMPUTER OPERATIONS

01 241699

## COMPUTER PROGRAMS

01 047566, 03 091197, 03 154741, 03 155771, 03 155819, 03 240761,  
04 159709, 05 143742, 06 155569, 08 073974, 08 096281, 08 146689,  
08 154726, 08 155478, 08 155499, 08 155621, 09 155620, 10 155637,  
10 155701

## COMPUTER SIMULATION MODELS

01 093409, 01 155473, 01 226285, 01 241925, 03 137194, 03 143952,  
03 155829, 03 155883, 08 057000, 08 146689, 08 150729, 08 154739,  
08 155456, 08 155460, 08 155532, 08 155895, 08 260232, 09 131164,  
10 163496

## COMPUTERIZED DESIGN

10 155539

## COMPUTERS

01 155483, 06 155546, 08 143307, 07 163537

## CONCESSIONS

02 155527, 02 155689

## CONCORDE AIRCRAFT

03 091352, 03 155785, 08 155852

## CONCRETE PAVEMENT CONSTRUCTION

06 155802

## CONCRETE SHELLS

06 163536

## CONCRETE STRUCTURES

01 155655

## CONCRETES

08 163540

## CONSOLES

10 163495

## CONSTRAINTS

03 131169, 03 228038, 06 145845, 09 131168, 09 131174

## CONSTRUCTION

02 155526, 02 155675, 02 155678, 02 155734, 02 155737, 02 155823,  
03 155610, 03 155835, 03 155886, 05 155679, 05 155770, 06 131161,  
06 155491, 06 155546, 06 155802, 06 155806, 06 158215, 06 158236,  
08 155577, 08 155713, 09 155576, 10 155458

## CONSTRUCTION COSTS

01 155661, 01 242342, 02 155689, 02 155889, 02 159713, 04 240712,  
10 203788

## CONSTRUCTION EQUIPMENT

03 223857, 06 080981

## CONSTRUCTION MANAGEMENT

06 155546

## CONSTRUCTION MATERIALS

06 155546, 09 163504

## CONSTRUCTION METHODS

06 080981, 06 155894

## CONSTRUCTION OPERATIONS

08 155892, 08 163531

## CONTAINERIZATION

08 155543

## CONTAINERS

10 155918

## CONTAMINANTS

05 155759

## CONTOUR MAPS

03 133135, 03 155771

## CONTRACT SPECIFICATIONS

06 080981

## CONTROL SYSTEMS

08 163539, 10 155841, 10 158218

## CONTROL THEORY

08 090717

## CONTROLLED ACCESS HIGHWAYS

01 241383

## CONVENIENCE

06 158236, 10 226655

## CONVERSION

06 145845

## CONVEYORS

09 155586, 10 155590, 10 155811, 10 155853

## COORDINATION

01 155588

## CORIOLIS FORCE

03 155814

## CORRELATION METHODS

03 155941, 04 155574, 08 163538



# Retrieval Term Index

## COST

01 155761, 01 241534, 01 242110, 01 242111, 01 265478, 02 155736,  
02 163508, 03 155511, 03 155519, 03 155768, 03 155776, 03 155808,  
04 139614, 06 155719, 06 155802, 06 155838, 06 155894, 06 158236,  
08 155500, 09 155576, 09 155888

## COST ALLOCATIONS

02 159574, 02 163487, 02 163488, 02 163491

## COST ANALYSIS

01 072047, 01 147044

## COST BENEFIT ANALYSIS

02 163488, 03 155668, 03 155819, 05 155679, 08 155713, 10 155919

## COST EFFECTIVENESS

01 051438, 01 073899, 01 134030, 02 155523, 03 090347, 03 155917,  
04 155450, 05 131166, 08 155713, 08 155867, 09 131165, 10 155458,  
10 155580

## COST ESTIMATES

01 043627, 03 155610, 03 228038, 06 151572

## COSTS

01 041878, 01 073899, 01 155473, 01 155534, 01 155613, 01 155721,  
02 155480, 02 155615, 02 155651, 02 155675, 02 155727, 02 155730,  
02 155733, 02 155774, 03 143176, 03 155518, 03 155520, 03 155708,  
03 201520, 03 223470, 05 155509, 05 155844, 05 159714, 06 131161,  
06 143009, 07 163513, 08 155645, 08 155649, 08 155700, 08 155711,  
08 155753, 08 155834, 08 163486, 08 163524, 08 260232, 10 073884,  
10 093463, 10 155622

## CRACKS

06 147285

## CREDIT

02 155496

## CREDIT CARDS

07 155591

## CRITERIA

02 152874, 02 155735, 02 155823, 03 155743, 05 145882, 06 155866,  
07 163492, 09 131162, 09 131165, 09 131167

## CROSS-SECTION

08 096281

## CTOL

03 094548, 03 155462, 04 155535

## CURB LOADING ZONE

10 155584

## CURBS

01 155473, 08 155834, 08 155839, 09 155664

## D

### DAKAR AIRPORT/SENEGAL

02 155678

### DALLAS/FORT WORTH AIRPORT

01 098920, 01 147384, 01 152720, 01 155624, 01 155682, 01 155738,  
01 155875, 01 155880, 01 226911, 02 155737, 03 155507, 05 084118,  
05 155862, 06 080981, 06 155877, 08 155577, 08 163527, 08 260232,  
09 155586, 09 155601, 09 163529, 10 148872, 10 152865, 10 155590,  
10 155748, 10 155909, 03 155813

### DAMAGE CONTROL

06 147285

### DAMAGES

03 155617, 03 223511

### DATA ACQUISITION

01 227950, 01 239535, 03 155783, 03 155913, 03 155933, 03 163480,  
05 147030, 08 054427, 08 154296, 08 155831, 08 155895, 08 203791,  
09 127047

### DATA ANALYSIS

01 228030, 01 228292, 02 155823, 03 155944, 03 158238, 04 163522,  
08 094536, 08 094537

### DATA BASE

01 155687, 03 155827, 04 155650, 09 155620

### DATA LINK

08 155476

### DATA PROCESSING

01 228292, 03 143176, 06 146652, 08 163538

### DATA RECORDING

03 158238

### DATA SAMPLING

08 155456

### DAY NIGHT LEVELS

03 091197, 03 133135, 03 136661, 03 137104, 03 155778, 03 155789,  
04 163514

### DAYTIME

08 080276, 08 151570

## DC 10 AIRCRAFT

03 137194

## DECELERATION RATE

08 155487

## DECISION MAKING

02 131159, 03 155944, 03 240691, 03 240791, 06 143009, 06 145845,  
06 155719, 06 155912, 09 131165, 10 155749

## DEFICITS

02 155725

## DEGRADATION

08 155532

## DEICING

09 163483

## DELAY

01 093409, 01 242111, 06 129627, 08 073774, 08 146689, 08 147279,  
08 150729, 08 150853, 08 154310, 08 155456, 08 155468, 08 155479,  
08 155499, 08 155700, 08 155714, 08 155831, 08 200606, 08 203781,  
09 127047, 09 131164, 10 260226  
01 260792, 08 155632, 08 203791, 09 155664

## DELAY AND CAPACITY SIMULATION MODEL

08 155632, 08 155947, 09 155664

## DELAYS

02 074545, 04 159709, 08 074073, 08 093584, 08 155649, 08 155681,  
08 155895, 08 155947, 08 163531, 09 131172, 09 155620, 10 155637,  
10 203787

## DELPHI METHOD

04 158216

## DEMAND

01 155697, 01 241534, 02 155508, 02 155670, 02 155675, 02 155732,  
04 155718, 04 155891, 08 155503, 08 155639

## DEMAND ACTUATED TRANSPORTATION

01 080637, 01 155738, 04 155662, 10 155757

## DEMAND FORECASTING

01 155528, 04 155450, 04 155871, 04 158216, 04 159709, 06 155801

## DEMAND MODEL

03 228038

## DEMOGRAPHY

01 239535, 04 163521

## DEMONSTRATION

01 127819

## DENSITY

08 080277, 08 155474

## DEPARTMENT OF TRANSPORTATION

01 155830

## DEPARTURES

04 092261

## DEPLANING

09 155620, 10 073897, 10 155637

## DEPLOYMENT

08 092175

## DEPOSITION

03 155883

## DEPRECIATION

02 155725, 02 155730, 03 155519

## DEROGATION EFFECTS

08 158237

## DESIGN

01 073875, 01 132054, 01 155473, 01 225169, 02 163508, 03 155783,  
04 240712, 05 155844, 06 080796, 06 131161, 06 155515, 06 155560,  
06 155569, 06 203778, 06 227275, 08 073774, 08 155498, 08 155536,  
09 155576, 09 226289, 10 073897, 10 093463, 10 127692, 10 131176,  
10 155562, 10 155570, 10 203784, 10 203787, 10 203788, 10 203792,  
10 242448, 10 155850

## DESIGN CRITERIA

01 242101, 08 057000, 08 155898, 10 155584

## DESIGN SPECIFICATIONS

03 155810

## DETECTORS

03 145844, 07 043646, 07 155489, 07 155741, 08 154295

## DETERMINISTIC MODELS

08 080640, 08 155493, 08 155947, 10 155622, 10 163496

## DETERMINISTIC THEORY

10 155837

## DETROIT METROPOLITAN AIRPORT

01 051466, 03 155926

## DEVELOPING COUNTRIES

02 155678, 02 155751, 06 155802

# Retrieval Term Index

**DEVELOPMENT**  
02 155481, 05 155821, 05 155832

**DIAL A RIDE**

01 155738

**DIAPHRAGM WALLS**

09 163528

**DIESEL ELECTRIC POWER**

09 158220

**DIFFERENTIAL EQUATIONS**

08 155493

**DIFFRACTION**

08 158237

**DIGITAL COMPUTER**

03 155502

**DIGITAL SYSTEMS**

03 155790, 08 154295

**DIKES**

06 155894

**DIMENSIONAL ANALYSIS**

08 163478

**DIRECT CONNECTION**

01 134030

**DISABILITY**

05 155844

**DISAGGREGATE MODEL**

01 073886, 01 098920

**DISASTER PREPAREDNESS**

07 155873, 07 163500, 07 163506

**DISCOUNT RATE**

02 155735

**DISCRETE ADDRESS BEACON SYSTEM**

08 155471

**DISPERSION**

03 155932, 03 155934, 03 155935

**DISPLAY SYSTEMS**

08 155595, 08 163512, 10 203788

**DISPLAYS**

08 073974

**DISTRIBUTION SYSTEMS**

08 155704

**DISTURBANCE**

08 080175

**DIURNAL VARIATIONS**

08 155493

**DRAG**

03 155776

**DRAINAGE**

03 155783, 06 129627, 06 147285

**DRILLS**

07 155873

**DRYING RATE**

08 155764

**DUAL LANE RUNWAYS**

08 057000, 08 203798

**DUAL MODES**

01 155561, 01 241559

**DUCTS**

03 158239

**DULLES INTERNATIONAL AIRPORT**

01 054550, 01 147044, 01 155533, 01 155534, 01 155561, 01 241925,  
01 241963, 06 146652, 06 155884, 08 073774, 08 159710

**DURABILITY**

08 155764, 08 207518

**DURATION**

03 155939

**DUSSELDORF AIRPORT/WEST GERMANY**

05 155769

**DYNAMIC PREFERENTIAL RUNWAY SYSTEM**

08 080174, 08 080175, 08 080176

**DYNAMIC PROGRAMMING**

08 155487, 08 155753, 08 159710

**DYNAMIC RESPONSE**

08 080640

## E

**ECOLOGY**

03 155568

**ECONOMIC ANALYSIS**

02 155481, 02 155675, 02 155696, 02 155727, 04 143864, 04 163521,  
06 155838

**ECONOMIC DEVELOPMENT**

02 155696, 03 155813, 05 155726, 05 155872, 06 143761, 06 145845

**ECONOMIC EFFICIENCY**

02 155480

**ECONOMIC EVALUATION**

02 155715, 02 155735

**ECONOMIC FACTORS**

02 131159, 02 155496, 05 155513, 06 155802, 09 131167

**ECONOMIC IMPACT**

02 155481, 02 155523, 02 155630, 02 155635, 02 155673, 02 155696,  
02 155751, 02 155906, 02 159713, 03 131169, 05 155726, 05 200576,  
06 130428, 06 143761, 06 146652, 06 155720, 06 155860, 08 144312,  
08 155577

**ECONOMIC POLICY**

02 155508

**ECONOMICS**

01 225169, 02 155527, 02 155672, 02 155689, 02 155724, 02 155732,  
02 155798, 02 155906, 02 163487, 03 155521, 03 155708, 03 155840,  
05 155509, 06 155884, 06 158217, 08 155505, 08 202302, 10 155604,  
10 155847

**ECONOMIES OF SCALE**

10 155458

**EDGE**

08 080276

**EFFECTIVE PERCEIVED NOISE LEVELS/AIRCRAFT NOISE**

03 261048

**EFFECTIVENESS**

02 155822, 02 155825, 08 094536

**EFFICIENCY**

01 072047, 06 158236, 10 144428, 10 155570

**ELASTICITY**

04 139614, 04 163484

**ELECTRIC LIGHTING**

09 158220

**ELECTRIC POWER**

01 155629

**ELECTRIC POWER TRANSMISSION**

09 155888

**ELECTRIC VEHICLES**

01 127819, 01 241332, 01 241699, 09 163489

**ELECTRICAL CONTROLS**

10 155853

**ELECTRICAL EQUIPMENT**

10 158218

**ELECTRICAL SYSTEMS**

06 163497, 08 155809, 08 163524, 10 155807

**ELECTRIFICATION**

01 155655, 01 242101

**ELECTROMAGNETIC COMPATIBILITY**

09 163529

**ELECTROMECHANICS**

08 155809

**ELECTRON SPIN RESONANCE**

07 094542

**ELECTRONIC EQUIPMENT**

06 155866, 07 155489, 10 158218, 10 203784

**ELECTRONIC SYSTEMS**

08 155809

**ELECTROSTATIC CHARGE**

08 163499

**ELEVATED GUIDEWAYS**

01 127819, 01 155629

**ELEVATED RAILWAY**

09 155586

**ELEVATED ROAD**

09 163504

**ELEVATORS**

01 241332, 10 155625

**EMERGENCY CONTINGENCY PLANS**

07 163506, 07 163507, 07 163516

**EMERGENCY FACILITIES**

07 163500

**EMERGENCY LANDING**

07 163498, 08 090717

**EMERGENCY LIGHTS**

09 163494

**EMERGENCY PREPAREDNESS**

07 155873, 07 163500, 07 163503

**EMERGENCY SERVICES**

05 155679, 08 163531

# Retrieval Term Index

## EMERGENCY VEHICLES

01 158240, 08 155867

## EMINENT DOMAIN

03 223511

## EMISSION CONTROLS

03 155933

## EMISSIONS

03 143952, 03 155742, 03 155861, 03 155932, 03 155935, 09 163529

## EMPLOYEES

01 155482, 01 155697, 01 155843, 01 228292, 05 155726

## EMPLOYMENT

02 155696, 02 155906, 02 159713, 06 143761

## ENERGY CONSERVATION

06 155868, 08 155710

## ENERGY CRISIS

05 099284, 08 155681

## ENERGY LEVELS

03 155812

## ENERGY RESOURCES

03 155857

## ENGINE DESIGN

03 155616

## ENGINE MODIFICATION

03 090347

## ENGINE NACELLES

03 155779, 03 155917, 03 158221

## ENGINE NOISE

03 143345, 03 239367

## ENGINE RUN-UP

03 155787

## ENPLANING

09 155620, 10 073897, 10 155637

## ENROUTE TRAFFIC CONTROL SYSTEMS

08 154295, 08 155817

## ENVIRONMENT

01 155613, 03 090347, 03 090348, 03 091196, 03 091197, 03 091198,  
03 093653, 03 093724, 03 093811, 03 093837, 03 094165, 03 094172,  
03 094264, 03 094296, 03 094469, 03 094548, 03 133135, 03 136661,  
03 136670, 03 137104, 03 137194, 03 143124, 03 143153, 03 143814,  
03 143952, 03 144429, 03 201520, 03 223470, 03 223511, 03 223857,  
03 224129, 03 224654, 03 226630, 03 228038, 03 239367, 03 239973,  
03 240207, 03 240691, 03 240761, 03 240791, 03 260837, 03 261041,  
03 261048, 03 261050, 03 261122, 03 261131, 03 261137, 03 261149,  
03 261216, 03 261233, 03 261278, 03 261289, 03 261399, 03 291036,  
04 155535, 05 084118, 05 132286, 06 080796, 06 143009, 06 155860,  
09 131168, 02 155615, 03 155618, 06 155894, 06 155912

## ENVIRONMENTAL CONTROL

03 131169

## ENVIRONMENTAL EFFECTS

03 155771, 05 155467

## ENVIRONMENTAL ENGINEERING

03 155568

## ENVIRONMENTAL IMPACT

01 134030, 01 155464, 01 155533, 01 242534, 02 155523, 03 090347,  
03 094165, 03 094172, 03 094296, 03 143345, 03 144322, 03 155522,  
03 155659, 03 155728, 03 155774, 03 155780, 03 155790, 03 155829,  
03 224654, 05 145882, 05 155679, 06 130428, 06 155720, 06 227275,  
08 155713

## ENVIRONMENTAL IMPACT STATEMENT

03 136661, 03 155886

## ENVIRONMENTAL LEGISLATION

03 155886, 05 131170

## ENVIRONMENTAL POLICY ACT

03 131169

## ENVIRONMENTAL PROTECTION

03 155708, 03 155744, 06 155838, 06 155876, 06 155878

## ENVIRONMENTAL PROTECTION AGENCY

05 145882, 05 155791

## ENVIRONMENTAL QUALITY

05 155694

## ENVIRONMENTAL SURVEYS

05 147030

## EQUIPMENT

01 073875, 03 143176, 03 145844, 03 155776, 03 261137, 04 154732,  
05 155759, 05 155844, 08 092377, 08 155500, 08 163482, 08 163486,  
10 073884, 10 155652, 10 155683, 10 155811

## EQUIPMENT MAINTENANCE

10 155811

## EQUITY

02 155671, 03 155766

## ERGONOMICS

08 163502

## ESCALATORS

08 155809, 10 155811

## ESTIMATES

01 155682, 03 155773, 03 155812, 04 163484

## EVALUATION

01 073899, 01 155687, 02 155481, 02 155824, 03 155829, 04 143864,  
05 147030, 07 163500, 08 155596

## EXHAUST GASES

03 155934, 08 155750

## EXHAUST NOISE

03 155772, 03 158239

## EXPANSION

01 155497, 01 155561, 02 131159, 02 155672, 02 155859, 05 155821,  
08 155753, 08 159710, 09 155576, 10 155510, 10 155807, 10 155909

## EXPENDITURES

02 155496, 02 155737

## EXPENSE

02 155735

## EXPLOSIVES

07 155489, 07 155741

## EXPLOSIVES DETECTION

07 094542

## EXPOSURE

08 080176

## EXPRESSWAY

01 241456

# F

## FACILITIES

01 242117, 04 154732

## FAILURE

10 158218, 10 158219

## FAIRBANKS INTERNATIONAL AIRPORT

03 091352

## FALLOUT

03 155883

## FAN NOISE

03 158239

## FARES

02 155732

## FAST TIME

08 057000

## FEASIBILITY STUDIES

01 054550, 03 155783, 03 155793, 03 155814, 06 155838, 06 155860,  
07 163492, 08 155713

## FEDERAL AID

02 155737, 03 131169, 09 131156, 09 131157

## FEDERAL ASSISTANCE PROGRAMS

02 155822, 02 155823, 02 155824, 02 155825

## FEDERAL AVIATION ADMINISTRATION

01 155830, 02 155494, 02 155825, 03 155780, 03 261399, 04 154732,  
04 155452, 06 155815, 07 163503, 08 155681

## FEDERAL AVIATION ADMINISTRATION REGIONS

05 090320

## FEDERAL COURT RULES

03 261399

## FEDERAL GOVERNMENT

02 163508, 03 155550, 03 155607, 05 155821

## FEDERAL HIGHWAY ADMINISTRATION

01 155830

## FEDERAL PROGRAMS

02 155615

## FEDERAL REGULATIONS

03 155780, 03 155931, 05 155454, 05 155791

## FEEDBACK

05 163530, 08 158235

## FEEDER SERVICES

04 155890

## FEES

02 074545, 02 155480, 09 127047

## FENCES

07 127284, 07 155741

## FIELD STUDIES

03 094548, 05 147030



# Retrieval Term Index

## FIELD TESTS

03 155932, 03 261289

## FILTERS

08 163499

## FINANCE

02 155615, 02 155889, 05 155821, 06 155846

## FINANCIAL MANAGEMENT

02 131159

## FINANCIAL REPORTS

02 155730

## FINANCING

01 155597, 02 155600, 02 155737, 06 129627, 06 155884, 08 144313

## FINES/PENALTIES

03 239973

## FIRE ALARM SYSTEMS

08 155809

## FIRE EXTINGUISHING AGENTS

07 155848, 07 163507

## FIRE FIGHTING

07 163477, 07 163537, 08 155665, 08 155666

## FIRE FIGHTING EQUIPMENT

07 155554, 07 163503, 07 163506, 07 163507, 07 163492

## FIRE HAZARDS

07 155848, 07 163492

## FIRE PROTECTION

01 226654, 07 163477

## FLEETS

08 155711

## FLEXIBILITY

04 155450

## FLIGHT

01 152720, 08 080175

## FLIGHT CHARACTERISTICS

03 155784

## FLIGHT CONTROL

03 261149

## FLIGHT CREWS.

03 094264, 07 163525

## FLIGHT PATHS

03 090348, 03 091196, 03 133135, 03 137104, 03 155589, 03 155779,  
03 155784, 03 155804, 03 155881, 03 155917, 03 240207, 04 147239,  
05 155454, 08 090717, 08 155486

## FLIGHT SAFETY

08 163533

## FLIGHT SERVICE STATIONS

08 155471

## FLIGHT TESTS

03 155944

## FLIGHT TIMES

08 155947

## FLOATING PLATFORMS

06 155858

## FLOW CHART

08 096281

## FLOW RATE

08 163499

## FLUSHING

03 136670

## FLYOVER NOISE

03 155462

## FLYOVERS/HOUSE VIBRATIONS

03 094548

## FOAMING AGENTS

07 155848, 07 163498

## FOAMS

07 163507, 07 163513

## FOG

08 080276, 08 163482

## FOG DISPERSAL

06 155896, 08 155946

## FORECASTING

01 155760, 01 155762, 01 155903, 01 239535, 02 155635, 02 155730,  
03 155502, 03 155521, 04 143864, 04 155897, 05 155467, 06 146652,  
06 158215, 08 137276, 09 131156, 10 155924

## FORECASTS

01 241458, 01 241459, 02 155675, 03 090347, 03 090348, 03 091197,  
03 133135, 03 155840, 03 155861, 03 224654, 04 090622, 04 240712,  
05 155904, 06 143009, 08 155503, 08 155505, 09 131157, 09 131168,  
10 144428

## FOREIGN COUNTRIES

03 094165, 03 094172

## FORKLIFT VEHICLES

10 155811

## FORTAN 4 PROGRAMMING LANGUAGE

03 143952

## FORTAN 5 PROGRAMMING LANGUAGE

03 090348

## FRANKFURT-MAIN AIRPORT/WEST GERMANY

03 155803, 04 155879, 10 155853, 10 158218, 10 158219, 10 163495  
10 203792

## FRAUD

07 155591

## FREE PARKING

01 080637

## FREEWAY RAMPS

01 134030

## FREWAYS

01 155760

## FREIGHT

07 127284

## FREIGHT HANDLING

08 155705

## FREIGHT TERMINALS

02 155678, 06 155707

## FREIGHT TRAFFIC

04 155908, 04 158214

## FREIGHT TRANSPORTATION

01 155484, 04 155833, 05 099284

## FREQUENCY

03 155936

## FRICTION

08 092377

## FRICTION COEFFICIENT

08 163478

## FRINGE PARKING

01 099521

## FUEL CONSUMPTION

08 155478

## FUEL COSTS

03 155857, 08 144312, 08 155536

## FUEL EFFICIENCY

03 155785

## FUEL PUMPS

08 163527

## FUEL STORAGE

08 163490

## FUELING OPERATIONS

02 155724, 05 155759, 08 155543, 08 163485, 08 163499

## FUELS

03 155934, 08 155704

## FUNDING

02 155494, 02 163508, 02 163535, 08 155577

## G

## GABIONS

08 163540

## GAS TURBINE ENGINES

03 155767

## GASES

07 163507

## GATES

06 155712, 07 163525, 08 155505, 08 155645, 08 155685, 08 155895,  
09 155888, 10 127692, 10 155457, 10 155458, 10 155539, 10 155847,  
10 155909

## GATWICK AIRPORT/LONDON

01 228529, 01 241457, 02 155667, 03 155708

## GEARS

03 155772

## GENERAL AVIATION

02 159574, 04 163514, 04 163521, 08 202302

## GENERATORS

08 163517, 09 155888, 09 158220

## GEOGRAPHIC LOCATION

05 155849

## GEOGRAPHICAL DISTRIBUTION

01 155611, 04 092261

## GLIDE PATHS

08 073974, 08 155498

# Retrieval Term Index

## GLIDE SLOPE

03 090347, 08 154726, 08 158237

## GOVERNMENT /NAT/

02 152874

## GOVERNMENT POLICIES

01 260792

## GOVERNMENT REGULATIONS

03 155520, 10 155749, 10 226655

## GPSS

10 155457

## GRADIENTS

01 242101

## GRADING

08 158237

## GRANTS

02 155798

## GRAPH CHARTS

08 143307

## GRAPHICS

05 143742

## GRAVITY VACUUM TRANSIT

01 241925

## GRID SYSTEMS

03 136661, 03 155819

## GROUND CONTROL

08 094531, 08 094538, 08 155460

## GROUND CONTROLLERS

08 155867

## GROUND CREWS

07 163516

## GROUND HANDLING

01 155761, 08 155543, 08 155852, 10 155811

## GROUND MOVEMENTS

08 163531

## GROUND OPERATIONS

03 155787, 07 163492, 08 080640, 08 163485, 08 260232

## GROUND POWER UNITS

09 155888

## GROUND RUNUP

03 136661, 03 155820

## GROUND SUPPORT EQUIPMENT

06 151572

## GROUND TRAFFIC

04 163521, 10 203787

## GROUND TRANSPORTATION

01 127819, 01 135405, 01 147384, 01 155677, 01 200156, 01 202532,  
01 242449, 01 263929, 01 263930, 04 155908, 08 155558, 08 155577,  
09 155586, 09 163529, 10 155925, 10 242448

## GROUND VEHICLES

03 143952, 03 155935

## GROWTH RATE

04 155602

## GUIDANCE

08 155514, 08 155764

## GUIDANCE SIGNS

07 155554

## GUIDELINES

03 155819, 05 155454

## GUIDEWAYS

01 039876, 01 155655, 01 155875, 01 241699, 01 242101, 10 148872  
01 155533, 01 155624, 10 155841, 01 241332, 01 155561

01 147384, 01 155556

## H

## HALOCARBONS

07 155848

## HALOGEN

09 163494

## HANDBOOKS

01 202301, 05 143742, 06 147285, 06 155546, 08 143307, 08 146689,  
08 155831

## HANDICAPPED PERSONS

06 144325

## HANGARS

02 155736, 05 155747, 06 163536, 07 163513

## HANOVER AIRPORT/WEST GERMANY

03 155512

## HARBORS

01 260186

## HARTSFIELD INTERNATIONAL AIRPORT/ATLANTA

03 155932, 08 057000

## HAZARDOUS CARGO

07 155593

## HAZARDS

08 155665, 08 155945

## HEADWAY

08 075265

## HEALTH

03 155928, 03 155937

## HEALTH CARE SERVICES

05 163530

## HEALTH PLANNING

05 163530

## HEARING

03 155936, 03 155937, 03 155940

## HEARING LOSS/NOISE

03 094264, 03 261041

## HEARINGS

02 163535

## HEAT RESISTANCE

08 207518

## HEATHROW AIRPORT/LONDON

01 044065, 01 155762, 01 241457, 02 155508, 02 155667, 03 155589,  
03 155905, 03 155928, 08 155704, 08 155852, 08 163502

## HELICOPTERS

01 241383, 03 154396, 03 155557, 04 147239

## HELIPADS

06 155560

## HELIPORTS

03 144322, 03 155557, 06 129627, 06 155560, 07 155554, 08 155666

## HEURISTIC METHODS

01 155534, 10 127692

## HIGH ALTITUDE

08 154306

## HIGH EXPANSION FOAMS

07 155848

## HIGH MAST LIGHTING

09 163505

## HIGH PRESSURE

08 092377

## HIGH SPEED GROUND TRANSPORTATION

01 039876, 01 099521, 01 155483, 01 155655, 01 242101, 01 242342,  
02 155635

## HIGH SPEED TRAINS

01 155549, 06 155712

## HIGH SPEED TRANSPORTATION

01 097723, 01 241456, 06 155876

## HIGHWAY CAPACITY

01 155760, 01 241455

## HIGHWAY LOCATION

03 240691, 03 240791

## HIGHWAY NOISE

03 155768, 03 261047, 03 261233

## HIGHWAY TRANSPORTATION

01 051438, 06 158215

## HIGHWAYS

01 155611, 04 155833

## HIJACKING

07 155591, 07 155755, 07 163525

## HISTOGRAMS

05 143742

## HOBBY AIRPORT/HOUSTON

04 139614

## HOLDING PATTERNS

08 075265

## HOLLOMAN AIR FORCE BASE

08 154296

## HONOLULU INTERNATIONAL AIRPORT

03 155659, 03 155742

## HORIZONTAL MOVEMENT

10 155853

## HOSPITALS

03 155607

## HOTELS

08 155573, 08 155717

# Retrieval Term Index

HOUSING  
03 155607, 03 155616  
HOUSTON INTERCONTINENTAL AIRPORT  
01 265478, 02 155737, 08 092377, 08 155633, 09 155601  
HUMAN FACTORS  
03 155942, 06 080796, 08 158235, 08 163502  
HUMAN FACTORS ENGINEERING  
10 152865  
HUMAN RESPONSE  
03 094548  
HUMIDITY  
03 155941  
HYDRANTS  
08 155704  
HYDROCARBONS  
03 226630  
HYDRODYNAMICS  
03 136670  
HYDROGEN  
08 163490  
HYDROGEN FUELS  
06 151572  
HYDROPLANING  
08 155606

**I**

ICE REMOVAL TECHNIQUES  
08 155754  
IDENTIFICATION  
07 155741  
IFR  
04 163514  
IMPACT  
01 043627, 01 043911, 01 051555, 01 147044, 01 155597, 01 155611,  
05 131170, 05 147030, 06 155695, 09 131155, 10 155457  
IMPACT STUDIES  
01 098920, 01 242100, 02 155822, 03 075396, 03 155553, 03 155766,  
03 155792, 03 155808, 03 155827, 08 155705, 10 155622, 10 155684  
IMPEDANCE  
03 155938  
IMPLEMENTATION  
03 075396, 03 075504, 04 155833, 06 155865, 08 158224, 10 155683  
IMPROVEMENT  
02 155737, 02 155859, 06 155569, 08 155503, 08 155543, 08 155753,  
09 131165, 09 131177, 10 155652, 10 260226  
INCOME  
02 155737  
INCREMENTAL COSTS  
02 163488  
INDEX  
03 155728  
INDIRECT COSTS  
02 155730  
INDUSTRIAL AREAS  
01 242100, 04 155662  
INDUSTRIAL DEVELOPMENT  
02 159713, 06 155720  
INDUSTRIAL PARKS  
06 130428, 06 143761  
INDUSTRY  
03 155550, 03 155767, 03 155790, 05 099284, 06 155815, 10 155924  
INFORMATION  
04 150763  
INFORMATION DISSEMINATION  
01 202301  
INJURIES  
07 163493  
INSPECTION  
08 155752  
INSPECTION SYSTEMS  
07 155585  
INSTALLATION MANUALS  
08 154355  
INSTRUMENT APPROACH  
08 137276  
INSTRUMENT FLIGHT RULES  
04 154732, 08 050141, 08 155654  
INSTRUMENT LANDING SYSTEMS  
07 155554, 08 155516, 08 155517, 08 155599, 08 158222, 08 158237  
08 154726

INSTRUMENTATION  
03 260837, 08 163482  
INSULATION  
03 158221  
INTENSITY  
03 155939  
INTERACTION  
09 131172, 09 131173  
INTERCHANGE DESIGN  
01 158240  
INTERCHANGES  
01 155911  
INTERCITY TRANSPORTATION  
01 047566, 01 155484, 01 201742, 01 241433, 10 155909  
INTERFACE  
01 155761  
INTERFERENCE  
09 163529  
INTERGOVERNMENT RELATIONS  
05 155513, 05 155609  
INTERMITTENT POSITIVE CONTROL  
08 155471  
INTERMODAL TERMINALS  
10 155604  
INTERMODAL TRANSPORTATION  
01 155677  
INTERNAL COMBUSTION ENGINE NOISE  
03 261137  
INTERNATIONAL AIRPORTS  
02 155725  
INTERNATIONAL TRAFFIC  
06 155801  
INTERVIEWS  
03 155501  
INTRA-AIRPORT TRANSIT  
01 155497, 01 155875, 01 155880, 01 242342, 01 242449, 04 155566,  
09 155601, 09 163489, 10 155757, 10 155909, 10 155916, 10 163476  
INTRASTATE TRANSPORTATION  
05 159714  
INVENTORIES  
01 242117, 06 143761  
INVERSE CONDEMNATION  
03 223511  
INVESTMENTS  
02 155672, 02 155675, 02 155696, 02 155735, 02 155816, 02 159713,  
02 163509, 06 155719, 06 155801, 06 155846, 08 155753, 10 155847  
ISLANDS  
03 136670  
ITERATIVE METHODS  
08 155700

## J

JET AIRCRAFT  
03 154396, 04 155545, 06 129627, 08 155705  
JET AIRCRAFT NOISE  
03 143345, 03 155550, 03 155937, 03 261048  
JET BLAST  
08 155945  
JET ENGINE NOISE  
03 090348, 03 133135  
JET ENGINES  
03 155861  
JOINING  
06 155802  
JUDGEMENT  
04 155450  
JUMBO JETS  
06 163536

## K

KANSAS CITY INTERNATIONAL AIRPORT  
01 241458, 03 155813, 06 163536, 08 155633, 10 155748, 10 203788  
KENNEDY INTERNATIONAL AIRPORT  
01 051466, 01 155561, 03 155507, 03 155607, 03 155659, 03 155789,  
03 155928, 03 240207, 05 155608, 06 144324, 08 080174, 08 080175,  
08 155514, 08 155867, 08 163511  
KINGSFORD SMITH INTERNATIONAL AIRPORT/SYDNEY  
06 155455  
KLOTEN AIRPORT/ZURICH  
06 155515



# Retrieval Term Index

## L

### LA GUARDIA AIRPORT

01 051466, 01 155541, 01 263929, 02 155651, 08 155486, 08 155750,  
09 163504, 04 159709

### LABOR INTENSIVENESS

10 155683

### LABORATORY EQUIPMENT

07 094542

### LABORATORY STUDIES

03 094548, 03 155942

### LABORATORY TESTS

03 155939, 03 261289

### LAGOS AIRPORT/NIGERIA

08 155892

### LAKE ERIE

03 136670, 03 155814

### LAND APPRAISAL

03 155520

### LAND DEVELOPMENT

02 159713, 03 155520, 05 084118

### LAND FILLS

03 155814, 06 155894

### LAND OWNERSHIP

03 155521

### LAND RECLAMATION

06 155806

### LAND USE

01 155464, 01 155656, 01 155698, 01 263930, 03 091198, 03 137194,  
03 155605, 03 155612, 03 155616, 03 155780, 03 155835, 03 155857,  
03 155863, 03 155917, 03 224654, 03 240761, 04 143864, 04 147239,  
05 155608, 05 155609, 05 155770, 06 145845, 06 155695, 06 155720,  
06 155860, 06 155868, 06 158217, 08 155577, 08 155710, 08 155717,  
08 155851, 09 131158, 09 131167, 09 155576

### LAND USE PLANNING

03 075504, 03 136661, 03 144322, 03 155502, 03 155785, 03 155804,  
03 239367, 05 155791, 06 155884, 06 155910, 06 155912

### LAND USE ZONING

03 155557

### LAND VALUES

02 155673, 03 155520

### LANDING

02 155615, 02 155736, 03 143153, 03 155827, 03 155937, 06 129627,  
06 155815, 08 073774, 08 155493, 08 155498, 08 155516, 08 155517,  
08 155621

### LANDING FEES

02 155480, 02 155667, 02 155732

### LANDING FIELDS

04 143864, 04 147239, 08 147279

### LANDING GEAR

08 080640

### LANDSIDE CAPACITY

01 039876, 01 041878, 01 043627, 01 043911, 01 044065, 01 044205,  
01 044206, 01 046998, 01 047566, 01 051326, 01 051438, 01 051466,  
01 051467, 01 051555, 01 054550, 01 072047, 01 073875, 01 073886,  
01 073899, 01 080637, 01 093409, 01 097723, 01 098920, 01 099521,  
01 127819, 01 131261, 01 134030, 01 135405, 01 155463, 01 155464,  
01 155465, 01 155473, 01 155477, 01 155482, 01 155483, 01 155484,  
01 155492, 01 155495, 01 155497, 01 155528, 01 155531, 01 155533,  
01 155534, 01 155541, 01 155548, 01 155549, 01 155556, 01 155561,  
01 155564, 01 155588, 01 155597, 01 155611, 01 155613, 01 155624,  
01 155629, 01 155638, 01 155655, 01 155656, 01 155661, 01 155674,  
01 155677, 01 155680, 01 155682, 01 155687, 01 155697, 01 155698,  
01 155716, 01 155721, 01 155760, 01 155761, 01 155762, 01 155830,  
01 155843, 01 155875, 01 155880, 01 155903, 01 155911, 01 155923,  
01 158240, 01 200156, 01 201742, 01 201790, 01 202048, 01 202301,  
01 202532, 01 223420, 01 225169, 01 226285, 01 226654, 01 226761,  
01 226911, 01 227950, 01 228030, 01 228292, 01 228529, 01 239535,  
01 239614, 01 241332, 01 241383, 01 241433, 01 241455, 01 241456,  
01 241457, 01 241458, 01 241459, 01 241460, 01 241534, 01 241559,  
01 241699, 01 241925, 01 241963, 01 242100, 01 242101, 01 242110,  
01 242111, 01 242117, 01 242342, 01 242449, 01 242534, 01 242561,  
01 260186, 01 260792, 01 263929, 01 263930, 01 265475, 01 265478,  
02 131159, 03 131169, 04 136851, 04 139614, 04 155535, 04 155566,  
04 155833, 04 155871, 04 158214, 04 291008, 05 131166, 05 131170,  
06 155707, 06 155838, 06 155842, 08 128751, 08 131171, 08 155503,  
08 155558, 08 155654, 08 155658, 08 155834, 09 127047, 09 131154,  
09 131155, 09 131156, 09 131157, 09 131158, 09 131162, 09 131163,  
09 131164, 09 131165, 09 131167, 09 131168, 09 131172, 09 131173,  
09 131174, 09 131177, 09 155586, 09 155620, 09 155664, 10 073884,

10 093463, 10 131176, 10 155510, 10 155570, 10 155625, 10 155683,  
10 155837, 10 155927, 10 203787

### LANDSIDE DESIGN AND OPERATIONS

01 132054, 01 155738, 08 163490, 09 163489, 09 163504, 09 163528,  
09 163529

### LASERS

08 163538

### LAWS

01 260186, 02 155859, 03 075396, 03 143345, 03 155519, 03 155521,  
03 155612, 03 155767, 03 155775, 03 155795, 03 239973, 03 261149,  
03 291036, 05 155769, 06 155878, 07 155593, 05 084118, 05 155821,  
05 155832

### LEASING

02 155527

### LEGAL ACTION

03 155785, 03 155863, 05 155454

### LEGAL ASPECTS

01 134030, 03 131169, 03 155607, 03 155744, 05 084118, 05 155513,  
05 155608, 08 155713

### LEGISLATION

01 155531, 02 163535, 03 131169, 03 155790, 03 261050

### LEGS

06 155858

### LENGTH

08 155536, 08 155711

### LENSES

07 155741, 08 158224

### LEONARDO DA VINCI INTERNATIONAL AIRPORT/ROME

06 158217

### LEVEL OF SERVICE

01 073886, 01 093409, 01 155483, 01 155677, 01 155716, 01 239535,  
02 155480, 04 155650, 04 159709, 05 155904, 08 128751, 08 131171,  
09 131154, 09 131155, 09 131156, 09 131162, 09 131163, 10 155457,  
10 155637, 10 155701, 10 155916, 10 159711

### LIABILITY

03 155521, 07 155593

### LIFT BRIDGES

10 155578

### LIFTS

08 155809, 10 155578, 10 155811

### LIGHT AIRCRAFT

03 154083

### LIGHT TRANSMISSION

08 151570

### LIGHTING

07 127284, 07 155554, 08 080276, 08 155514, 08 155665, 08 155714,  
08 155752, 08 155809, 08 155945, 08 163539, 09 163494

### LINCOLN AIRPORT

06 144324

### LINE HAUL TRANSPORT

01 241433

### LINE OF SIGHT

08 154306

### LINEAR INDUCTION MOTOR

01 155629, 01 155655, 01 242101, 10 155757

### LINEAR PROGRAMMING

02 074545, 03 155917

### LINEAR REGRESSION

04 155871

### LINK IMPEDANCE

01 241433

### LINKAGE

01 099521, 01 155629, 01 155656, 01 155911, 06 155712, 08 155817,  
01 241383

### LIQUEFACTION

06 151572, 08 163490

### LIQUID HYDROGEN

06 151572, 08 163526

### LIQUIDS

07 163507

### LITERATURE SURVEY

03 093653

### LOAD FACTORS

08 200606

# Retrieval Term Index

## LOADING

08 163515, 08 163539, 09 163483

## LOADING AND UNLOADING OPERATIONS

10 155918

## LOCAL GOVERNMENT

02 155734, 03 075396, 03 155550, 05 155609, 05 155821

## LOCAL SERVICE AIR CARRIERS

04 155890, 04 155891

## LOCATION

01 073899, 01 155477, 01 155534, 08 155487, 10 155887

## LOGAN INTERNATIONAL AIRPORT

01 044065, 01 155482, 01 241460, 02 155689, 03 091352, 03 155507,  
03 155659, 08 057000

## LOGIC CIRCUITS

08 163527

## LOGISTICS

06 080796

## LONG HAUL

08 163490, 08 163526

## LONG RANGE

04 155450, 04 155574

## LONG RANGE PLANNING

04 155451

## LOOPS

10 155916

## LOS ANGELES INTERNATIONAL AIRPORT

01 039876, 01 155629, 01 155760, 01 155923, 01 226761, 01 242101,  
01 242342, 03 137104, 03 155507, 03 155659, 03 155795, 03 155805,  
03 155881, 03 155920, 03 155933, 03 155934, 03 155937, 03 155940,  
07 155873, 08 057000, 10 155504

## LOUDNESS

03 143345, 03 155942

## LOW ALTITUDE

08 154295

## LOW DENSITY

01 080637, 01 239535

## LUBBOCK AIRPORT

06 144324

## LUMINAIRES

08 155945, 09 163494

## LUMINANCE

08 163482

## LUMINOUS INTENSITY

08 151570

## LUTON AIRPORT/U.K.

03 155913

## M

## MAIL

04 092261, 04 150763

## MAIL TRANSPORTATION

10 155909

## MAINTENANCE

01 155880, 02 155734, 02 155859, 06 155491, 06 155515, 07 163506,  
08 154355, 08 155665, 08 155754, 08 155945, 10 155841

## MAINTENANCE EQUIPMENT

05 155747

## MAINTENANCE OPERATIONS

03 155820

## MANAGEMENT

03 155783, 05 131166, 05 163530, 07 163516, 09 131165, 09 131167,  
09 131168

## MANAGEMENT PLANNING AND CONTROL

08 147279

## MANAUS AIRPORT/BRAZIL

06 155806

## MANCHESTER AIRPORT/UK

06 155846

## MANUALS

07 155585, 08 155834

## MANUFACTURERS

06 155815

## MAPLIN AIRPORT/LONDON

01 155911, 04 155897, 05 155904, 06 155910, 08 155898

## MAPPING

05 155609

## MARGINAL COSTS

02 163488

## MARINE PLATFORM

06 158236

## MARKERS

08 155514

## MARKET POTENTIAL

04 155890

## MARKET RESEARCH

04 155453

## MARKETING

06 145845

## MARKING

07 155554, 08 155665

## MARKOV MODELS

05 159714

## MASS TRANSIT

01 051555, 01 135405, 01 155556, 01 241455, 06 227275, 10 155757

## MATHEMATICAL MODELS

01 155875, 02 155670, 02 155673, 03 144429, 03 155917, 03 155935,  
03 226630, 04 143864, 04 155879, 04 159709, 06 146652, 07 163479,  
07 163513, 08 080277, 08 128751, 08 150853, 08 154726, 08 163478,  
10 144428, 10 155641, 10 155837

## MATRIX

10 155684

## MEAN ENERGY LEVEL

03 144429

## MEAN/STATISTICAL

04 163484

## MEASUREMENTS

08 163534, 02 155481

## MEASURES OF EFFECTIVENESS

01 260792, 03 155854

## MEASURING

03 155617, 03 155618, 05 155726, 07 155593, 09 131154, 09 131163

## MEASURING INSTRUMENT

03 163480

## MECHANICAL EQUIPMENT

10 073882, 10 155853

## MECHANICAL PARKING GARAGES

01 226285

## MECHANICAL SYSTEMS

08 155809

## MEDICAL EQUIPMENT

07 163500

## MENTAL PERFORMANCE

08 154336

## MERCURY LAMPS

09 163494

## METAL DETECTORS

07 155741

## METEOROLOGICAL DATA

03 143952, 03 155742, 08 155474

## METEOROLOGY

03 155861, 03 155883, 03 155941, 08 163511

## METERING

08 093584, 08 155654

## METHODOLOGY

01 073899, 01 155682, 01 155911, 02 155715, 03 145844, 03 155786,  
03 155820, 04 155450, 04 155452, 04 163523, 06 155874, 08 147279,  
08 155753, 08 155947, 08 159710, 10 155562, 10 155652, 10 159711

## METROLINER TRAINS

02 155635

## METROPOLITAN AIRPORT/DETROIT

07 155585

## METROPOLITAN AREAS

01 147044, 03 239973, 05 155608, 06 155455, 08 155685, 08 159710,  
10 155887

## METROPOLITAN WASHINGTON TRANSIT SYSTEM

01 147044

## MIAMI INTERNATIONAL AIRPORT

01 155561, 03 155507, 06 144324, 10 155647

## MICROPHONES

03 155722

## MICROPROCESSOR

08 163512

## MICROWAVE EQUIPMENT

07 043646, 07 155741

## MICROWAVE LANDING SYSTEM

08 155471, 08 155621, 08 158222, 08 158224

## MIDWAY AIRPORT

04 159709

# Retrieval Term Index

## MILAN INTERNATIONAL AIRPORT/ITALY

06 158217

## MILITARY AIRCRAFT

03 155820, 04 163521

## MILITARY AIRFIELDS

03 155784, 07 155554

## MILITARY ORGANIZATIONS

02 159574

## MILITARY TRANSPORTATION

05 155542

## MINIBUS

01 155738

## MINICOMPUTERS

08 155648

## MIRABEL AIRPORT/MONTREAL

01 131261, 03 155813, 08 155851, 10 155748, 06 130428

## MOBILE EQUIPMENT

10 155578

## MOBILE LOUNGES

01 155561, 08 155851, 10 155457, 10 155537, 10 155578, 10 155847

## MOBILITY

08 163486

## MODAL CHOICE

01 155495, 01 155911, 01 228030

## MODAL SPLIT

01 044205, 01 044206, 01 073886, 01 097723, 01 098920, 01 155697,

01 228292, 01 241534, 01 241963, 04 136851, 04 163484

## MODE

01 073886, 01 073899

## MODELS

01 073886, 01 152720, 01 155464, 01 155477, 01 155495, 01 155541,

01 155564, 01 155611, 01 155716, 01 200156, 01 227950, 02 155671,

02 155816, 02 159713, 03 154741, 03 155518, 03 155883, 03 224129,

03 240691, 03 240791, 04 155545, 04 155650, 04 163484, 05 155694,

06 155569, 06 155719, 08 073774, 08 073974, 08 080175, 08 090395,

08 150729, 08 155487, 08 155498, 08 155643, 08 155669, 08 155685,

08 155831, 09 131164, 10 073884, 10 155637, 10 155887

## MODIFICATION

03 155644

## MODULAR STRUCTURES

10 155584

## MODULATION

08 158237

## MODULES

06 155712

## MOMBASA AIRPORT/KENYA

10 155748

## MONITORING

03 143176, 03 145844, 03 155810, 03 155854, 03 155905, 03 155913,

03 155932, 03 155935, 05 145882, 05 155759, 08 155471, 08 163511,

08 163533, 10 158218, 10 163496

## MONORAIL SYSTEMS

01 044065, 01 241456, 10 155757

## MONTREY PENINSULA AIRPORT

04 155871

## MONTGOMERY COUNTY AIRPORT

04 240712

## MOTION STUDIES

08 163511

## MOTOR VEHICLE NOISE/SUBJECTIVE RATINGS

03 261289

## MOTOR VEHICLES

03 155768

## MOTORCYCLE

03 154083

## MOTORIST AID SYSTEMS

01 158240, 01 226761

## MOTORIST COMMUNICATION SYSTEMS

01 155923

## MOVING WALKWAYS

01 099521, 10 155504, 10 155853

## MULTIDISCIPLINARY TEAMS

03 155618

## MULTIMODAL TRANSPORTATION

01 099521, 05 155542, 06 155876, 09 131174

## MULTIPATH TRANSMISSION

08 154726

## MULTIPLE AIRPORT MODEL

06 155874

## MULTIPLE USE

06 155695

## MULTISTORY STRUCTURES

01 225169

## MUNICH RIEM AIRPORT/WEST GERMANY

10 155850

## MUNICIPALITIES

05 155454, 06 145845

## MUTIPLE PATHS

08 155621

## N

## NACELLES

03 075504, 03 155612, 03 155616

## NAIROBI AIRPORT/REPUBLIC OF KENYA

02 155678

## NATIONAL AIRPORT/D.C.

01 147044, 01 155534, 01 239535, 03 143952, 03 155813, 06 146652,

08 159710

## NATIONAL DEFENSE

06 155815

## NATIONAL TRANSPORTATION NEEDS

05 200576

## NATIONAL TRANSPORTATION SAFETY BOARD

07 163500

## NAVIGATION

08 155478

## NAVIGATION SYSTEMS

07 155554

## NAVIGATIONAL AIDS

08 154306

## NEF COMPUTER PROGRAM

03 090348

## NEGATIVE PRESSURE

08 155750

## NEIGHBORHOODS

05 163532

## NESTING

08 155851

## NETWORK ANALYSIS

01 155674

## NETWORK FLOW

08 155649

## NETWORKS

01 260792, 10 155683

## NEUTRON ACTIVATION ANALYSIS

03 155934

## NEW ORLEANS INTERNATIONAL AIRPORT

01 242110, 01 242111

## NEWARK INTERNATIONAL AIRPORT

01 155661, 01 158240, 04 155451, 09 163505, 10 155579

## NIGHT

03 155789, 03 155808, 03 155920, 08 080276, 08 151570

## NIGHT VISIBILITY

08 163531, 08 207518

## NITRIC OXIDE

03 155861

## NOISE ABATEMENT

02 155494, 03 075396, 03 143176, 03 155550, 03 155616, 03 155785,

03 155786, 03 155808, 03 155881, 03 158238, 03 158239, 03 261047,

05 155608, 05 155609, 05 155791

## NOISE ABATEMENT/LAND USE PLANNING

03 154319

## NOISE ANALYZERS

03 155722

## NOISE BARRIERS

03 155805

## NOISE CERTIFICATION CRITERIA

03 155926, 05 155770

## NOISE CONTOURS

03 093811, 03 136661, 03 144322, 03 144429, 03 155502, 03 155610,

03 155779, 03 240761

## NOISE CONTROL

03 093837, 03 143153, 03 143345, 03 154319, 03 155462, 03 155512,

03 155520, 03 155553, 03 155644, 03 155767, 03 155775, 03 155779,

03 155780, 03 155786, 03 155787, 03 155790, 03 155804, 03 155854,

03 155905, 03 155914, 03 239367, 03 239973, 03 260837, 03 261041,



# Retrieval Term Index

03 261050, 03 261233, 03 261399, 03 291036, 04 158214, 05 132286,  
05 155513, 05 155694, 05 155791  
**NOISE CONTROL/LEGISLATION**  
03 155931, 03 223857  
**NOISE EFFECT ON HEALTH**  
03 094264  
**NOISE EMISSION**  
03 091352  
**NOISE EXPOSURE**  
03 075504, 03 091196, 03 091197, 03 091198, 03 093811, 03 133135,  
03 136661, 03 137104, 03 143124, 03 143153, 03 143814, 03 155462,  
03 155501, 03 155502, 03 155550, 03 155610, 03 155659, 03 155767,  
03 155771, 03 155774, 03 155779, 03 155780, 03 155784, 03 155795,  
03 155804, 03 155810, 03 155812, 03 155819, 03 155835, 03 155881,  
03 155905, 03 155913, 03 155920, 03 155926, 03 155936, 03 155937,  
03 155939, 03 224654, 03 240207, 03 261131  
**NOISE EXPOSURE FORECAST**  
03 155778, 03 155789, 03 155827  
**NOISE GENERATION**  
05 155609  
**NOISE LEVELS**  
03 075396, 03 094469, 03 143124, 03 143814, 03 144429, 03 154083,  
03 154396, 03 155502, 03 155520, 03 155524, 03 155550, 03 155553,  
03 155557, 03 155589, 03 155610, 03 155722, 03 155772, 03 155774,  
03 155777, 03 155787, 03 155795, 03 155810, 03 155827, 03 155829,  
03 155840, 03 155905, 03 155913, 03 155926, 03 155929, 03 155936,  
03 155937, 03 155941, 03 261050, 03 261289, 03 291036, 05 155769,  
06 155865, 08 155713  
**NOISE MASKING**  
03 093724, 03 143345, 03 155939  
**NOISE MEASUREMENT**  
03 143176, 03 155462, 03 155501, 03 155612, 03 155722, 03 155767,  
03 155777, 03 155778, 03 155795, 03 155827, 03 155926, 03 155940,  
03 155941, 03 155944, 03 158238, 03 163480, 03 260837, 03 261289  
**NOISE METERS**  
03 155722  
**NOISE NUISANCE/MEASUREMENT UNITS**  
03 155768, 03 155840  
**NOISE NUMBER INDEX**  
03 155766, 03 155812, 03 155913, 03 223470, 03 261048, 03 261216,  
08 144312  
**NOISE POLLUTION**  
03 143345, 03 155550, 03 155744, 03 155776, 03 155777, 03 155886,  
03 239973, 03 261149, 03 261399, 05 147030  
**NOISE POLLUTION LEVELS**  
03 155812, 03 260837, 03 261048, 03 261122, 03 261216  
**NOISE POLLUTION LEVELS/COMMUNITY REACTION**  
03 155557  
**NOISE POLLUTION/ANNOYANCE**  
03 223470  
**NOISE PROPAGATION**  
03 155921, 03 158239, 03 224129, 03 261233  
**NOISE REDUCTION**  
03 075504, 03 090347, 03 090348, 03 093811, 03 094165, 03 094172,  
03 094296, 03 137194, 03 143153, 03 145844, 03 155511, 03 155610,  
03 155612, 03 155708, 03 155722, 03 155744, 03 155767, 03 155768,  
03 155774, 03 155776, 03 155804, 03 155805, 03 155808, 03 155835,  
03 155857, 03 155863, 03 155881, 03 155914, 03 155917, 03 155940,  
03 155943, 03 158221, 03 239367, 03 261048, 03 261278, 03 291036,  
04 090622, 05 147030, 05 155770  
**NOISE SOURCES**  
03 155804, 03 261137, 03 261149  
**NOISE SUPPRESSORS**  
03 155804  
**NOISEMAP**  
03 136661, 03 143124, 03 155771  
**NON-LINEAR SYSTEMS**  
05 155694, 08 080640  
**NORFOLK REGIONAL AIRPORT**  
03 155568  
**NORTHEAST CORRIDOR**  
02 155635  
**NUCLEAR MAGNETIC RESONANCE**  
07 094542  
**NUCLEAR QUADRUPOLE RESONANCE**  
07 094542

## O

**O'HARE INTERNATIONAL AIRPORT/CHICAGO**  
01 155561, 03 155507, 03 155616, 03 155935, 08 093584, 08 094531,  
08 094536, 08 094537

**OAKLAND INTERNATIONAL AIRPORT**  
01 155531, 01 242100, 07 155873  
**OBSTRUCTIONS**  
08 155665  
**OCCUPATIONAL SAFETY AND HEALTH**  
07 163516  
**OFFSHORE AIRPORTS**  
02 163508, 03 155793, 03 155814, 04 158214, 06 155455, 06 155838,  
06 155858, 06 155860, 06 155894, 06 158236, 08 155713  
**OFFSHORE CONSTRUCTION**  
06 155858  
**ON LINE SYSTEMS**  
08 163512  
**ONE DEGREE OF FREEDOM**  
08 155460  
**OPERATING COSTS**  
01 242342, 01 265475, 02 155508, 02 155724, 02 155725, 08 163490,  
08 202302, 10 155847, 02 155494  
**OPERATING REVENUES**  
02 155725  
  
**OPERATIONAL PROCEDURES**  
06 155569  
**OPERATIONAL READINESS**  
01 155880  
**OPERATIONAL RESEARCH**  
05 155542  
**OPERATIONS**  
10 155622  
**OPTIMIZATION**  
01 155477, 02 155672, 08 075265, 08 096281, 08 155711, 08 155753  
**OPTIMUM**  
10 144428  
**ORDER OF MAGNITUDE ESTIMATES**  
03 155934  
**ORIGIN AND DESTINATION**  
01 097723, 01 228292, 04 155545  
**ORIGIN AND DESTINATION STUDIES**  
01 044206, 01 155464, 01 155484  
**OVERFLIGHT**  
03 155787, 03 155920, 03 155926, 03 155936, 03 155939, 03 155940,  
03 163480, 08 080174, 08 080175, 08 080176  
**OVERLAY**  
08 155514  
**OWNERSHIP**  
02 163508, 06 155884

## P

**PAINTS**  
08 155764  
**PALLETIZING**  
08 155543  
**PANELS**  
03 158221  
**PARALLEL RUNWAYS**  
06 155712, 08 050141  
**PARALLEL TAXIWAYS**  
08 203791  
**PARAMETRIC ANALYSIS**  
06 155858  
**PARK AND RIDE**  
01 155463  
**PARKING**  
01 044065, 01 051467, 01 155923, 01 226654, 01 226761, 01 226911,  
02 155678, 02 155724, 04 155871, 05 099284, 06 227275, 08 073774,  
08 155654, 08 155834, 08 163531, 09 131162, 09 131177, 09 163494,  
09 163504, 10 152864, 10 155757, 10 155807, 10 155909, 10 203784  
**PARKING COSTS**  
09 226289  
**PARKING FACILITIES**  
01 155463, 01 155528, 01 223420, 01 225169, 01 226285, 01 263929,  
04 155729, 05 155747, 06 144325, 08 155633, 08 155717, 09 155601,  
09 155664, 09 226289, 10 155584  
**PARKING GARAGES**  
09 127047  
**PARKING LOTS**  
01 127819, 01 241963, 06 155560, 07 127284  
**PARKING REGULATIONS**  
05 155747

# Retrieval Term Index

## PARTICULATES

03 226630

## PASSENGER AIRCRAFT

04 092261, 04 150763

## PASSENGER COMFORT

10 155845

## PASSENGER COUNTING

01 051467

## PASSENGER FLOW

06 144325, 06 155884, 10 155458, 10 155504, 10 163476, 10 203784

## PASSENGER INFORMATION

10 155579

## PASSENGER LOADS

08 155645, 08 200606

## PASSENGER OPERATIONS

01 155561, 08 155547, 09 155576, 10 155578, 10 155584, 10 155634

## PASSENGER SAFETY

07 127284

## PASSENGER SERVICES

01 242117

## PASSENGER TERMINALS

01 241433, 02 155678, 04 155897, 04 155901, 04 155908, 06 155846, 08 155750, 09 163494, 10 152865, 10 155539, 10 155749, 10 155757, 10 155847, 10 155919, 10 163476, 10 163495, 10 203784

## PASSENGER TRAFFIC

01 241458, 04 155729, 04 155908, 04 158214, 06 155707, 09 226289, 10 127692, 10 155570, 10 155578, 10 226655

## PASSENGER TRANSPORTATION

01 047566, 01 147044, 01 147384, 01 241699, 05 099284

## PASSENGER VEHICLES

10 155458

## PASSENGERS

01 073899, 01 093409, 01 152720, 01 155482, 01 155484, 01 155656, 01 155697, 01 155760, 01 155761, 01 155830, 01 155875, 01 228030, 01 228292, 01 263929, 02 155635, 02 155667, 02 155859, 04 139614, 04 150763, 04 155545, 04 155574, 04 155602, 04 155650, 04 155871, 05 155849, 06 155515, 06 155560, 06 155719, 06 155806, 06 155865, 07 043646, 07 163525, 08 155573, 08 155669, 08 155895, 09 131162, 09 131163, 09 131172, 09 155586, 10 073884, 10 073897, 10 152864, 10 155510, 10 155537, 10 155562, 10 155571, 10 155578, 10 155579, 10 155622, 10 155625, 10 155637, 10 155641, 10 155684, 10 155748, 10 155807, 10 155836, 10 155837, 10 155882, 10 155909, 10 155925, 10 159711, 10 203787, 10 242448, 10 260226

## PATHS

10 155457

## PATROL

07 155741

## PATRONAGE

01 043627, 01 046998, 01 155680, 01 242100, 04 240712

## PAVEMENT BASES

06 147285

## PAVEMENT DESIGN

06 129627

## PAVEMENT MAINTENANCE

06 147285

## PAVEMENT MARKINGS

08 207518

## PAVEMENTS

06 147285

## PAYLOAD

08 155710

## PAYMENT

09 127047

## PAYROLL

02 159713

## PEAK HOUR

01 241963, 02 155480, 02 155615, 08 143307, 08 155479, 08 155654, 10 155537, 10 155927, 10 144428

## PEAK HOUR TRAFFIC

01 265475, 04 136851, 04 155602, 04 155879, 04 163514, 06 155896, 08 155627, 08 155645, 08 155681, 08 163531

## PEAK LEVELS/TRAFFIC NOISE

03 155766

## PEAK LOAD

02 155670

## PEAK RATES

02 155480

## PEDESTRIAN BRIDGES

09 163504

## PEDESTRIAN TRAFFIC

10 242718

## PEDESTRIANS

01 147044, 01 241559, 10 159712, 06 146652

## PEOPLE MOVERS

01 073875, 01 155497, 01 155738, 01 223420, 01 241559, 01 241699, 01 265478, 06 080796, 08 155633, 09 155586, 10 073882, 10 155510, 10 155757, 10 155841, 10 242718

## PERCEIVED NOISE LEVELS

03 155778

## PERFORMANCE

01 242561, 03 155929, 04 155650, 08 260232, 10 155916

## PERFORMANCE STANDARDS

01 073875

## PERSONALITY TESTS

03 155928

## PERSONNEL

04 154732, 07 155585, 08 163531, 10 155847

## PERSONNEL SAFETY

07 127284, 07 163516

## PERSONNEL TRAINING

05 155872, 07 155585, 07 163525, 10 155811

## PERTURBATION

08 155493

## PHASED ARRAYS

08 158224

## PHILADELPHIA INTERNATIONAL AIRPORT

01 155484

## PHYSICAL CHARACTERISTICS

06 155491

## PHYSIOLOGICAL EFFECTS

03 091196, 03 094264, 03 094296, 03 143814, 03 155930

## PIERS

08 155645, 08 155839, 10 155457

## PILOT PERFORMANCE

08 151570

## PILOT STUDY

03 093653

## PILOTS

08 080276

## PLANNING

03 154319, 03 291036, 04 154732, 04 155452, 05 155467, 06 146652, 07 163516, 08 146689, 08 150729, 10 073884, 10 093463, 10 155539, 10 155919, 10 155924

## PLASTIC DESIGN

09 163504

## PLOTTERS

03 154741

## POISSON RATIO

08 155493

## POLICE

01 158240, 07 127284, 07 155755, 07 163506

## POLICY

01 155716, 02 155816, 03 155589, 03 155808, 03 155835, 03 155914, 04 155718, 04 155891, 05 155513, 05 155608, 05 155609, 06 155794, 06 155815, 06 155912, 07 155585, 08 155685

## POLICY MAKING

01 155495, 08 144313

## POLITICS

03 155553, 03 155813, 03 155863, 03 240691, 03 240791, 05 084118, 05 155513, 06 155720, 06 155802, 06 155846, 09 131168

## POLLS

01 073886

## POLLUTANTS

03 155742

## POLYNOMIALS

08 096281

## POPULATION

02 155696

## POPULATION DENSITY

01 134030, 01 155464

## POROUS FRICTION COURSE

08 155514

## PORT AUTHORITIES OF NEW YORK AND NEW JERSEY

04 155453

## POSTAL SERVICES

04 158214

## POWDERS

07 155848, 07 163507

## POWER EQUIPMENT

09 155888

# Retrieval Term Index

## POWER GENERATION

09 155888

## POWER PLANTS

03 155790, 03 158239

## POWER SOURCES

08 163517

## POWER SPECTRAL DENSITY

08 080640

## POWER SUPPLY

09 158220

## POWER SYSTEMS

08 163517

## PRECISION APPROACH RADAR

08 154296

## PREDICTIONS

01 073886, 01 155464, 02 155816, 03 091196, 03 091198, 03 154319,  
03 155501, 03 155518, 03 155784, 03 155935, 03 261048, 03 261131,  
04 090888, 04 155545, 08 073774, 08 073974, 08 093584, 08 154726,  
08 155947, 08 163478, 08 163524

## PREFABRICATED STRUCTURES

10 152864

## PREFERENCE

03 240207

## PRESSURE

08 155474, 08 163527

## PRICES

02 155480, 02 155508, 02 155600, 03 155708, 08 155669

## PRICING

02 155635, 02 155651, 02 155667, 02 155670, 02 155672, 02 155675,  
02 155689, 02 155730, 02 155732, 02 155733, 02 155736, 02 155816,  
04 155718, 08 155711, 08 202302, 10 155683

## PRIORITIES

01 080637

## PRIORITIES

09 131158

## PRIORITY

04 155833, 10 158219, 09 131158, 01 080637

## PRIVATE INDUSTRY

06 155801

## PRIVATE OWNERSHIP

07 155554

## PROBABILITY

10 155684

## PROBABILITY DISTRIBUTION

01 155682

## PROCEDURES

05 155844

## PROCESSING

09 155620, 10 155836, 10 155837, 10 155850

## PRODUCTIVITY

08 154739

## PROFILES

05 155454

## PROFITS

02 155798, 03 155520

## PROGRAM MANAGEMENT

02 155825

## PROGRAMMING MANUALS

08 150729

## PROJECTIONS

08 155946

## PROPELLER NOISE

03 133135

## PROPELLERS

03 155772

## PROPULSION CONTROLS

09 163529

## PROTECTION

08 163540

## PROTOTYPES

08 163482

## PSYCHOLOGICAL ASPECTS

03 093653, 03 093724, 03 094296, 03 155773, 03 155930

## PSYCHOLOGY

03 155942, 07 163525

## PUBLIC ADDRESS SYSTEMS

05 155747, 10 155579, 10 163495

## PUBLIC HEALTH

03 143345

## PUBLIC INFORMATION SYSTEMS

08 155809

## PUBLIC OPINION

03 155605

## PUBLIC OWNERSHIP

02 155496

## PUBLIC PARKING FACILITY

01 135405

## PUBLIC PARTICIPATION

06 155912

## PUBLIC POLICY

03 155550, 08 202302

## PUBLIC TRANSIT

01 155556, 01 200156

## PUBLIC TRANSPORTATION

01 044065, 01 080637, 01 155677, 01 155738, 01 155762, 01 239535,  
01 241457, 01 241963, 04 155535, 04 155833, 06 155910

## PULSE CODE MODULATION

10 155579

## PURITY

05 155759

## Q

## QUALITY CONTROL

05 155759

## QUANTIFICATION

06 155569

## QUANTITATIVE ANALYSIS

08 080174, 08 080176, 09 155620

## QUESTIONNAIRES

01 051467, 03 155501, 03 155820, 03 155928, 03 201520, 04 155891

## QUEUEING

04 159709, 08 074073, 08 155493, 08 155947, 09 155620, 10 073884,  
10 155622, 10 155637, 10 155641, 10 155701, 10 155837, 10 159711,  
10 159712

## QUEUEING MODELS

08 155700, 10 163496

## QUEUEING THEORY

01 093409, 08 155479

## QUIET AIRCRAFT

03 155881

## R

## RADAR APPROACH CONTROL

08 154296

## RADAR DATA

08 155476

## RADAR DETECTION

07 163493

## RADAR NAVIGATION

08 154336

## RADAR STATION

08 154296

## RADAR SURVEILLANCE

08 163533

## RADARS

08 155817

## RADIATION HAZARDS

07 043646

## RADIO FREQUENCY SPECTROSCOPY

07 094542

## RADIOS

01 155923, 01 226761, 08 154355

## RADIOTELEPHONES

08 163531

## RAIL TRANSPORTATION

01 044065, 01 051326, 01 155638, 01 155656, 01 155762, 01 201790,  
01 241455, 01 241456, 01 241457, 01 241460, 01 242110, 01 242111,  
01 242534, 06 155910, 06 158215

## RAILROAD STATIONS

01 241433, 09 163489

## RAINFALL

06 147285

## RAMP CONTROL

08 094531

## RAMPS

08 094537, 08 155714, 08 163524, 09 163504



# Retrieval Term Index

## RANDOM VARIABLES

08 155486

## RANGE DISTANCES

04 147239

## RAPCON

05 090320

## RAPID TRANSIT

01 043911, 01 044205, 01 051438, 01 051466, 01 054550, 01 072047,  
01 080637, 01 131261, 01 135405, 01 147044, 01 155533, 01 155624,  
01 155677, 01 155698, 01 155875, 01 228030, 01 228292, 01 241383,  
01 241458, 01 241459, 01 241925, 01 242110, 01 242111, 01 265475,  
01 265478, 06 130428, 09 155601, 10 155850, 01 044206

## RATES COSTS

02 155734

## REACTANCE

09 155888

## REACTIVITY

08 163517

## REAL TIME

08 057000, 08 090395

## RECORDING

03 145844

## RECORDINGS

03 155939

## RECOVERY

05 155844, 08 163486

## RECREATION

04 155662

## RECREATIONAL FACILITIES

08 155717

## REFLECTOR MARKERS

08 155764

## REFUELING

08 155852, 08 163502, 08 163527

## REGIONAL AREAS

01 242100, 03 240761

## REGIONAL DEVELOPMENT

02 155481

## REGIONAL PLANNING

02 155672, 02 155696, 03 075396, 03 155618, 03 155723, 06 143761,  
08 144312, 08 155681

## REGIONAL PLANNING /TRANSPORTATION/

01 155531, 01 260186

## REGIONAL TRANSPORTATION

01 131261

## REGRESSION ANALYSIS

03 155926

## REGULATIONS

03 143345, 03 145844, 03 155786, 03 155835, 03 155886, 03 155943,  
03 163480, 03 261047, 03 261399, 05 084118, 05 132286, 05 145882,  
05 147030, 07 155591

## REGULATORY CONSTRAINTS

05 131170

## REHABILITATION

06 155491

## REINFORCEMENT

06 155802

## RELATIVE CAPACITY ESTIMATING PROCESS

08 154739

## RELIABILITY

07 163537, 10 158218

## REMOVAL

08 092377

## REPAIRS

06 155491, 10 158218

## REPORTING METHODS

02 155730

## REQUIREMENTS

01 073875, 02 155825, 03 155607, 08 094538, 10 155748

## RESCUE EQUIPMENT

07 155554, 07 163503, 07 163507

## RESCUE OPERATIONS

07 163477, 07 163500, 08 155665, 08 155666

## RESEARCH AND DEVELOPMENT

03 094296, 03 155780, 08 131171, 09 131155, 09 131162, 09 131165,  
09 131168, 05 131166, 06 146652

## RESIDENTIAL AREAS

01 155464, 01 239535, 03 094469, 03 154319, 03 155722, 03 155785,  
03 155793, 03 155803, 03 155829, 03 155881, 03 223470, 03 261131,  
03 261233, 04 155662

## RESOURCE ALLOCATION

01 155597, 01 200156, 02 155736

## RESOURCE MANAGEMENT

08 146689

## RESOURCES

06 143761, 06 145845

## RESTAURANTS

08 155573

## RESTRICTIONS

03 155612

## RESURFACING

08 155752

## RETAIL TRADE

02 155696

## RETROFIT DEVICES

02 155494

## RETROFITTING

02 155494, 03 075504, 03 155512, 03 155612, 03 155708, 03 155785,  
03 155808, 03 155881, 03 155917

## RETURN ON INVESTMENT

08 155536

## REVENUE

01 046998, 01 155680, 02 155526, 02 155527, 02 155689, 02 155727,  
02 155731, 02 155734, 02 155735, 02 155736, 02 155737, 02 159574,  
02 163487, 04 092261, 04 155718, 05 155509, 06 143009

## REVIEWS

01 200156, 03 094165, 03 094172, 03 155618, 05 132286, 08 155643

## RIDE QUALITY

08 127693

## RIDERSHIP

01 044205, 01 044206, 01 228292, 01 242342

## RIGHT-OF-WAY

01 135405, 01 155656, 01 155698

## RIVERS

03 136670

## ROCHESTER-MONROE COUNTY AIRPORT/NEW YORK

07 163506

## ROCKETS

07 163537

## ROCKS

08 163540

## ROTARY WING AIRCRAFT

03 144322, 04 147239

## ROUTE SELECTIONS

04 155718

## ROUTES

01 041878, 01 043627, 03 155589, 04 155545, 08 154306

## ROUTING

01 039876, 01 158240, 01 242100, 05 155542, 06 155912

## RTOL

03 155462

## RUBBER

08 092377

## RUBBER TIRES

01 241699

## RUNOFF

06 147285

## RUNWAY LIGHTS

08 151570

## RUNWAY SPACING

06 203778, 08 050141, 08 155567, 08 155599, 08 203791

## RUNWAY VISUAL RANGE

08 080276, 08 163538

## RUNWAYS

01 242117, 02 155480, 02 155724, 03 155723, 03 240207, 04 155451,  
04 240712, 06 146652, 06 155491, 06 155707, 06 155842, 06 203778,  
08 057000, 08 073774, 08 074073, 08 080174, 08 080175, 08 080176,  
08 080276, 08 080277, 08 080640, 08 092377, 08 096281, 08 127693,  
08 147279, 08 150729, 08 150853, 08 151570, 08 155456, 08 155468,  
08 155474, 08 155486, 08 155487, 08 155498, 08 155499, 08 155503,  
08 155505, 08 155514, 08 155517, 08 155536, 08 155547, 08 155558,  
08 155567, 08 155577, 08 155595, 08 155599, 08 155606, 08 155621,  
08 155643, 08 155665, 08 155666, 08 155710, 08 155711, 08 155752,

# Retrieval Term Index

08 155753, 08 155754, 08 155764, 08 155898, 08 159710, 08 163539,  
08 202302, 08 203781, 08 203791, 08 203798, 08 207518, 09 131158,  
09 155664, 10 203788  
**RURAL AREAS**  
03 291036, 05 159714, 06 146652  
**RUSH HOUR**  
01 239535

## S

**SABOTAGE**  
07 155755  
**SAFETY**  
01 134030, 03 155605, 03 155776, 05 155679, 06 155560, 06 155894,  
07 155593, 07 163537, 08 155517, 08 155532, 08 155559, 08 155710,  
08 155714, 08 155764, 08 207518, 10 155504, 10 155811, 10 155916  
**SAFETY DEVICES**  
10 155853  
**SAFETY MEASURES**  
07 155554, 08 155666  
**SAFETY PRACTICES**  
08 155752  
**SAFETY STANDARDS**  
07 163503  
**SAMPLING**  
04 155729  
**SAN FRANCISCO INTERNATIONAL AIRPORT**  
01 041878, 01 043627, 01 046998, 01 155531, 01 155548, 01 155680,  
03 155659, 07 155873, 08 155895, 09 127047, 10 155504  
**SAN JOSE MUNICIPAL AIRPORT**  
01 155531, 03 137194, 03 143153  
**SANA'A AIRPORT/YEMEN**  
02 155889  
**SATELLITE TERMINALS**  
01 155483, 01 155534, 09 155601, 10 155887, 10 155925  
**SATELLITES**  
08 155839  
**SATURATION**  
04 155650, 08 163515  
**SCALE MODELS**  
03 155805, 03 155921, 06 163536  
**SCANNING**  
08 155517, 08 158224  
**SCATTER**  
08 154726, 08 158237, 08 163482  
**SCHEDULING**  
01 152720, 01 155843, 02 155480, 04 092261, 04 155718, 04 155871,  
05 155542, 05 159714, 06 155560, 08 075265, 08 090717, 08 150853,  
08 155649, 08 155685, 08 155852, 10 260226  
**SCHIPHOL AIRPORT/AMSTERDAM**  
01 051326, 08 154336, 08 155947, 10 155807 08 155468

**SCHOOL CHILDREN**  
03 155929  
**SCHOOLS**  
03 155607, 03 155940  
**SCREENING**  
07 163525  
**SEA**  
08 163540  
**SEALANTS**  
03 155790  
**SEAPORTS**  
06 155910  
**SEATTLE-TACOMA INTERNATIONAL AIRPORT**  
01 051466, 01 223420, 01 241699, 03 155659, 03 155783, 09 155601,  
10 155579, 10 155916, 10 155927  
**SECURITIES /BONDS/**  
02 155526  
**SECURITY**  
01 226654, 07 043646, 07 094542, 07 127284, 07 155591, 07 155755,  
08 155704  
**SENSITIVITY ANALYSIS**  
04 155450, 04 163514, 04 163521, 08 203791  
**SEPARATIONS**  
08 074073  
**SEPARATORS**  
08 163499  
**SERVICE**  
01 043627, 08 155852

**SERVICE LEVELS**  
01 155531, 01 242449  
**SERVICE TIME**  
08 155947, 09 127047  
**SERVICES**  
02 155733, 05 159714, 06 155719  
**SHIPS**  
06 155860  
**SHOPPING CENTERS**  
01 134030  
**SHORT HAUL**  
01 201742, 03 228038, 10 131176, 04 139614, 04 155535, 08 155536  
**SHORT TAKE-OFF AIRCRAFT**  
06 155455  
**SHORT-HAUL**  
04 139614, 04 155535, 08 155536  
**SHUTTLE SERVICE**  
01 099521, 01 155661, 01 241383, 01 263929, 09 155586, 09 155601,  
10 155916  
**SIGNAL PROCESSING**  
03 155767  
**SIGNING**  
07 127284  
**SIGNS**  
08 155514, 08 155665  
**SIMULATION**  
03 094469, 03 155742, 03 155767, 07 163537, 08 073974, 08 090395,  
08 154295, 08 155517, 08 155643, 08 155831, 10 073884, 10 155457,  
10 155837  
**SIMULATION MODEL**  
01 155875, 06 155569, 08 154310, 08 155499, 08 155649, 08 163515,  
10 073884, 10 155571, 10 155622, 10 155625, 10 155882, 10 155634  
**SINGAPORE AIRPORT**  
05 155849, 10 155749  
**SINGLE AIRPORT MODEL**  
06 155874  
**SITE INVESTIGATION**  
02 159713, 06 155884  
**SITE SELECTION**  
01 051555, 03 155521, 03 155813, 06 155838, 06 155894, 06 155910,  
06 155912, 08 155547, 10 155927  
**SITES**  
08 155567  
**SIZE**  
06 155515  
**SLANT RANGE**  
08 163482, 08 163538  
**SLOPE**  
08 155474, 08 155710  
**SLOPE INDICATORS**  
08 154355  
**SLUDGE TREATMENT**  
09 163483  
**SLUSH**  
08 163524  
**SMALL AIRCRAFT**  
03 154396, 03 155772  
**SMALL AIRPORTS**  
03 155840, 04 155718  
**SMALL CARS**  
01 241559  
**SMALL CITIES**  
03 155501  
**SMOKELESS POWDER**  
07 094542  
**SNOW AND ICE CONTROL**  
08 163524, 09 163510  
**SNOW CLEARANCE EQUIPMENT**  
09 163510  
**SNOW REMOVAL**  
08 155754  
**SOCIAL IMPACTS**  
03 155743  
**SOCIAL NEEDS**  
04 155891  
**SOCIAL RESEARCH**  
03 261122  
**SOCIOECONOMIC ASPECTS**  
01 155911, 01 239535, 01 241534, 02 155635, 02 155751, 03 155553,

# Retrieval Term Index

- 03 155813, 03 155829, 03 155863, 03 240691, 03 240791, 04 155574,  
04 155897, 04 240712, 05 155862, 06 155695, 06 155720, 08 131171,  
09 131168, 10 155684
- SOCIOLOGICAL ASPECTS**
- 01 134030, 03 155507, 03 155928, 03 155930, 05 084118, 05 155467
- SODIUM LAMPS**
- 09 163494
- SOIL SURVEY**
- 08 155713
- SOLAR ENERGY**
- 08 163524
- SOLAR HEATING**
- 08 163524
- SOLID STATE**
- 08 163517, 08 163527
- SONIC BOOM**
- 03 093837, 03 143345, 03 261050
- SOUND ABSORPTION**
- 03 137194
- SOUND LEVEL**
- 03 154741
- SOUND PRESSURE**
- 03 155610
- SOUND PROPAGATION**
- 03 155938
- SOUNDPROOFING**
- 03 155520, 03 155607, 03 155616, 03 155835, 03 155863
- SPACE ALLOCATION**
- 01 155473
- SPACING**
- 01 155473, 08 080277, 08 093584, 08 155654
- SPATIAL STRUCTURES**
- 06 080796
- SPECIAL SERVICE**
- 01 155698
- SPECIFICATIONS**
- 03 091197, 03 155941, 03 261047, 06 155546, 07 163537, 08 155666
- 08 155596
- SPEECH RECOGNITION**
- 03 093724
- SPEED**
- 01 242579, 08 155710, 10 155504, 10 158219
- SPRINKLER SYSTEMS**
- 07 163513
- ST LOUIS INTERNATIONAL AIRPORT**
- 03 155813, 04 163521, 04 163522, 04 163523
- STABILIZED PLATFORMS**
- 06 155858
- STANDARD DEVIATION**
- 03 155926
- STANDARDIZATION**
- 02 155724
- STANDARDS**
- 02 155823, 02 155825, 03 143345, 03 155553, 03 155767, 03 155777,  
06 143009, 06 155866, 07 163479, 07 163516, 08 155907
- STANDBY EQUIPMENT**
- 10 163495
- STAPLETON INTERNATIONAL AIRPORT/DENVER**
- 03 155507, 08 163511
- STATE AGENCIES**
- 02 155822, 02 155823, 02 155824
- STATE GOVERNMENT**
- 01 155830, 03 155550, 05 155821
- STATE LAW**
- 03 155607
- STATE OF THE ART**
- 04 158216, 06 158236, 08 093888, 08 131171, 08 155516, 08 155643,  
09 131172
- STATIONS**
- 01 155655, 01 241925
- STATISTICAL ANALYSIS**
- 01 155473, 03 155920, 05 143742
- STATISTICAL METHODS**
- 03 155930
- STATISTICS**
- 01 155697, 01 155716, 01 228292, 01 241534, 03 261041, 04 092261,  
04 150763, 04 158216, 05 143742, 06 143009, 08 155479, 08 163534,  
10 155625
- STEADY STATE**
- 03 155814, 03 155932
- STEAM**
- 08 163524
- STEEL CONSTRUCTION**
- 10 155584
- STEELS**
- 09 163504
- STOCHASTIC PROCESS**
- 01 093409, 08 080640, 08 155685, 10 155837, 10 163496, 08 074073
- STOL AIRCRAFT**
- 01 265475, 02 155635, 03 075504, 03 155462, 03 155512, 03 224129,  
04 155535, 06 155865, 06 155866, 06 155868, 08 155536, 08 155547
- STOL PORTS**
- 01 265475, 03 155793, 06 129627, 06 155860, 06 155865, 06 155866
- STORAGE**
- 05 155759
- STRATEGIES**
- 03 155932, 08 075265, 10 155458
- STRATIFICATION**
- 03 136670
- STRUCTURAL DESIGN**
- 06 155546
- STRUCTURAL VIBRATION**
- 03 091352
- STRUTS**
- 06 155588
- STUDENTS**
- 08 080276
- STUTTGART AIRPORT/WEST GERMANY**
- 03 155803
- SUBJECTIVE RATING**
- 08 127693
- SUBSIDIES**
- 01 155556, 02 155615, 05 159714
- SUBSONIC AIRCRAFT**
- 08 163490
- SUBSONIC FLIGHT**
- 03 091352
- SUBSYSTEMS**
- 08 155717
- SUBURBS**
- 01 080637
- SUBWAYS**
- 01 044065, 01 147044, 01 155762
- SUMMER**
- 03 136670
- SUPERSONIC AIRCRAFT**
- 03 155659
- SUPERSONIC TRANSPORT**
- 01 241456, 03 091352, 03 158239
- SUPPLIERS**
- 08 163526
- SUPPLY AND DEMAND**
- 02 155672, 06 155455, 06 155874
- SURCHARGE**
- 02 155667
- SURFACE DYNAMICS PROFILOMETER**
- 08 127693
- SURFACE ROUGHNESS**
- 08 127693
- SURFACE TRANSPORTATION**
- 01 098920, 01 155697, 01 155760, 01 155762, 01 155911, 03 155790,  
03 155931, 03 261047, 08 155643, 10 155571
- SURPLUS**
- 02 155672
- SURVEILLANCE**
- 08 092175, 08 094531, 08 094538, 09 163529
- SURVEYS/DATA COLLECTION**
- 01 044206, 01 051467, 01 155564, 01 227950, 01 228030, 01 228292,  
01 263929, 03 145844, 03 155743, 03 155820, 03 155920, 03 261122,  
04 155729, 04 155891, 05 155726, 06 147285, 08 155456, 10 155592,  
10 155836, 10 159711, 10 159712
- SWITCHING SYSTEMS**
- 08 163539, 10 163495
- SYDNEY INTERNATIONAL AIRPORT**
- 08 155505
- SYSTEM PLANNING**
- 06 155874
- SYSTEMS ANALYSIS**
- 01 263930, 05 155770, 06 155878, 08 128751, 10 155571



# Retrieval Term Index

## SYSTEMS APPROACH

10 242448

## SYSTEMS DESIGN

01 155880, 05 155542, 05 163530, 08 050141

## SYSTEMS ENGINEERING

03 228038

## T

### TABULATION PROCESSES

05 143742

### TAKEOFF

03 137194, 03 143345, 03 155772, 03 155779, 03 155941, 08 073774, 08 150729, 08 163539

### TAKEOFF AND LANDING

02 155480, 03 091352, 03 155787, 03 155905, 03 155936, 04 155879, 07 163493, 08 074073, 08 090717, 08 155456, 08 155468, 08 155499, 08 155649, 08 155681, 08 155710, 08 155867, 08 203781, 08 203798, 03 158221

### TAMPA INTERNATIONAL AIRPORT

02 155737, 03 155813, 08 155633, 09 155576, 09 155601, 10 155625, 10 155916

### TAPE RECORDERS

03 155936, 03 155941, 08 054427

### TASK PERFORMANCE

08 073974, 08 154336

### TAX CONCESSIONS

02 155600

### TAXATION

02 155859, 02 159574, 02 159713

### TAXICABS

01 080637

### TAXIING

03 155787, 03 155905, 03 155932, 08 094537, 08 155468, 08 155596, 08 163531

### TAXIWAYS

05 155679, 06 155846, 06 155896, 08 155456, 08 155505, 08 155514, 08 155834, 08 155839, 08 155851, 08 155898, 08 155945, 08 163524, 08 203781, 09 155664

### TECHNOLOGICAL DEVELOPMENT

04 155897, 08 155898, 10 155684

### TECHNOLOGY

03 155744, 03 155786, 03 155793, 05 155513, 05 155862, 08 155817, 10 155703

### TEHRAN INTERNATIONAL AIRPORT

06 155712

### TELEPHONE SYSTEMS

08 155809, 10 155579

### TELEPHONY

03 093724

### TELEVISION

03 093724, 03 155939

### TEMPELHOF AIRPORT/WEST BERLIN

05 155758

### TEMPERATURE

03 155938, 03 155941, 08 155474, 09 163483

### TEMPORARY AIRPORTS

06 163497

### TERMINAL CONGESTION

01 051466, 02 074545

### TERMINAL DESIGN

01 155464, 01 155561, 01 155721, 04 155729, 05 155467, 05 155509, 06 131161, 06 144324, 06 227275, 08 155547, 08 155633, 08 155645, 08 155658, 10 073882, 10 073897, 10 093463, 10 127692, 10 131176, 10 152865, 10 155457, 10 155458, 10 155510, 10 155570, 10 155604, 10 155703, 10 155706, 10 155807, 10 155845, 10 155924, 10 155925, 10 155927, 10 203784, 10 203787, 10 203788, 10 203792, 10 242448

### TERMINAL DESIGN AND OPERATIONS

08 163512, 08 163515, 08 163517, 09 163494, 10 155584, 10 163476, 10 163496

### TERMINAL FACILITATION

01 226654, 04 155871, 04 291008, 05 090320, 06 131161, 06 143009, 06 155707, 08 155558, 08 155851, 09 131162, 09 131172, 10 073882, 10 073897, 10 127692, 10 131176, 10 152864, 10 152865, 10 155457, 10 155458, 10 155504, 10 155537, 10 155539, 10 155562, 10 155570, 10 155571, 10 155578, 10 155579, 10 155580, 10 155590, 10 155592, 10 155622, 10 155634, 10 155637, 10 155641, 10 155647, 10 155652, 10 155684, 10 155701, 10 155748, 10 155757, 10 155811, 10 155836, 10 155837, 10 155841, 10 155845, 10 155847, 10 155850, 10 155853, 10 155887, 10 155909, 10 155916, 10 155918, 10 155925, 10 155927,

10 158218, 10 158219, 10 159712, 10 203784, 10 226655, 10 242718, 10 260226

### TERMINAL FLIGHT FACILITIES

04 143864, 05 090320, 08 151570

### TERMINALS

01 047566, 01 073875, 01 135405, 01 242110, 02 155736, 03 155881, 05 099284, 05 155849, 06 129627, 06 155712, 06 155874, 06 155896, 06 155910, 08 073974, 08 074073, 08 090717, 08 137276, 08 155460, 08 155468, 08 155478, 08 155505, 08 155516, 08 155517, 08 155532, 08 155705, 08 155753, 08 155834, 08 155839, 08 163490, 08 163526, 09 155576, 09 155620, 09 163489, 09 163504, 09 163505, 10 144428, 10 155625, 10 155683, 10 159711

### TERMINALS/TRANSPORTATION

01 134030, 01 155477, 02 155527, 04 155451, 08 155493

### TERRAIN

08 154726

### TERRAIN AVOIDANCE

08 154295

### TERROSISM

07 155755

### TESTING

01 155880

### THERMOCLINES

03 136670

### THIRD GENERATION SYSTEM

08 080277, 08 155817

### THREE DIMENSIONAL MODELS

03 136670, 08 155478

### THROUGHPUT

08 203798

### THRUST REVERSAL

03 155787

### TICKET

07 155591

### TICKETING

01 241455, 09 131177, 10 073884, 10 073897, 10 155625

### TIME

01 155875

### TIME AND MOTION STUDIES

10 159712

### TIME DEPENDANCE

03 155814, 08 155493, 08 155700

### TIME LAG

08 143307

### TIME MEASUREMENT

03 154083, 08 143307

### TIME SAVING METHODS

01 155477, 10 226655

### TIME STUDIES

10 159711, 10 159712

### TIME VARIANT CONDITION

04 159709

### TIRE PAVEMENT INTERACTIONS

08 163478

### TITANIUM

03 155934

### TOKYO INTERNATIONAL AIRPORT

01 044065, 01 241456

### TOLEDO AIRPORT

06 144324

### TOLLS

02 155651, 08 155669

### TORONTO INTERNATIONAL AIRPORT

02 155673, 10 260226

### TORONTO ISLAND AIRPORT

06 155865

### TOURISM

02 155751, 04 158216, 06 155806

### TOWER

08 054427

### TOWER AUTOMATED GROUND SURVEILLANCE

08 155595

### TOWERS

08 163482, 09 163505, 10 155845, 08 054427

### TOXICITY

09 163483

### TRACE ELEMENTS

03 155934

# Retrieval Term Index

## TRACKED AIR CUSHION VEHICLES

01 039876, 01 155629, 01 155655, 01 242342, 01 242101

## TRADE DEVELOPMENT

08 155717

## TRADE-OFFS

08 155907

## TRAFFIC

01 097723, 01 155923, 05 143742, 06 146652

## TRAFFIC ASSIGNMENT

01 098920

## TRAFFIC CAPACITY

04 090888, 08 146689, 08 147279, 08 150729, 08 150853, 10 093463

## TRAFFIC CONFLICT

08 154739

## TRAFFIC CONGESTION

01 044065, 01 155473, 01 155903, 01 202048, 01 227950, 01 241383,  
01 241456, 01 241460, 01 242100, 01 242110, 01 242111, 01 263930,  
02 155615, 04 090888, 04 136851, 04 155908, 06 155868, 08 074073,  
08 155476, 08 155499, 08 155532, 08 155681, 08 155700, 09 131157,  
09 131164

## TRAFFIC CONTROL

01 158240, 01 226761, 06 158215, 07 155585, 08 073974, 08 074073,  
09 163504

## TRAFFIC CONTROL AND LANDING SYSTEMS

08 154296

## TRAFFIC COUNT

01 155682, 01 227950

## TRAFFIC COUNTING

01 152720

## TRAFFIC DELAY COSTS

02 155630

## TRAFFIC DELAYS

01 202048, 01 263930, 08 154739, 08 155536, 08 155753

## TRAFFIC DENSITY

08 163486, 08 163524

## TRAFFIC DISTRIBUTION

01 241963

## TRAFFIC FLOW

01 093409, 01 155482, 01 155687, 01 155830, 01 239535, 03 155840,  
06 155801, 06 155884, 08 075265, 08 094537, 08 154739, 08 155478,  
08 155498, 09 131164, 10 155634, 10 159712

## TRAFFIC FORECASTS

01 054550, 01 155492, 04 090888, 04 136851, 04 147239, 04 155450,  
04 155451, 04 155452, 04 155453, 04 155545, 04 155574, 04 291008,  
05 090320, 05 155769, 08 054427, 09 131165, 09 226289, 03 228038

## TRAFFIC GENERATION

04 163484

## TRAFFIC INCIDENT DETECTION

01 158240

## TRAFFIC LEVELS

05 090320, 08 155839

## TRAFFIC LOAD

04 155879, 08 154739

## TRAFFIC MANAGEMENT

01 158240, 08 155817

## TRAFFIC MARKING MATERIALS

08 207518

## TRAFFIC MARKINGS

08 155666, 08 155764

## TRAFFIC MODELS

08 144312, 08 155632

## TRAFFIC NOISE

03 155767, 03 223511, 03 261122, 03 261216, 03 261278, 03 291036

## TRAFFIC NOISE/SOURCE

03 261233

## TRAFFIC REGULATION

08 155632

## TRAFFIC REGULATIONS

05 155747

## TRAFFIC SAFETY

01 155655

## TRAFFIC SATURATION

08 143307

## TRAFFIC SURVEILLANCE

01 158240, 08 154739

## TRAFFIC SURVEYS

01 147384

## TRAFFIC VOLUME

01 051438, 01 098920, 01 134030, 01 152720, 01 155682, 01 241455,

01 241457, 01 241963, 01 242117, 04 136851, 04 139614, 04 155602,  
04 155908, 04 163484, 06 155712, 08 155834, 09 127047, 10 155625  
01 155843

## TRAINING

03 155774

## TRAINING PLANES

03 155840

## TRAJECTORY OPTIMIZATION

08 155460

## TRANSATLANTIC FLIGHTS

04 155729

## TRANSFER

04 155729, 08 155645, 10 155539, 10 158219, 10 163476, 10 242448

## TRANSMISSION

06 163497

## TRANSPORT AIRCRAFT

06 151572

## TRANSPORTATION

03 155893, 08 155645

## TRANSPORTATION ADMINISTRATION

06 158215

## TRANSPORTATION CORRIDORS

01 241925, 01 242100, 03 155723, 06 155876, 10 155845

## TRANSPORTATION ECONOMICS

02 152874, 02 155635, 04 158216

## TRANSPORTATION FINANCE

01 041878, 01 241455

## TRANSPORTATION MANAGEMENT

05 155542, 06 146652

## TRANSPORTATION MODELS

01 147384

## TRANSPORTATION MODES

01 073899, 01 132054, 01 155531, 01 202532, 05 155467, 06 158215

## TRANSPORTATION NOISE

03 094165, 03 094172, 03 094296, 03 261048, 03 261137, 03 261149,  
03 261233

## TRANSPORTATION NOISE/LEGISLATION

03 155931, 03 261047

## TRANSPORTATION NOISE/MEASUREMENT

03 261233

## TRANSPORTATION NOISE/URBAN PLANNING

03 239367

## TRANSPORTATION PLANNING

01 135405, 01 147044, 01 155588, 01 155677, 01 241458, 01 260186,  
01 263929, 05 099284, 05 155542, 05 200576, 06 158215

## TRANSPORTATION POLICY

05 099284

## TRANSPORTATION SYSTEMS

01 051555, 01 073875, 01 155465, 10 155510

## TRANVERSE GROOVING

08 155606

## TRASH DISPOSAL

05 155747

## TRAVEL

01 155495, 06 146652

## TRAVEL COSTS

01 155495, 01 155661

## TRAVEL DEMAND

01 047566, 01 072047, 01 073886, 01 155464, 01 155484, 01 155588,  
01 155721, 01 201742, 01 241332, 02 155816, 04 155450, 04 155545,  
04 155566, 05 155904, 05 159714, 06 155874, 08 144313, 10 155927

04 139614

## TRAVEL DEMAND MODELS

01 155482, 01 155492

## TRAVEL DEMANDS

04 155453

## TRAVEL DISTANCE

04 139614

## TRAVEL FORECASTING MODELS

01 155564

## TRAVEL MARKET

04 155574

## TRAVEL PATTERNS

01 135405, 01 155492, 01 239535, 01 241458, 10 159712

## TRAVEL SURVEYS

01 155682, 04 155453

# Retrieval Term Index

## TRAVEL TIME

01 051438, 01 072047, 01 155477, 01 155483, 01 155484, 01 155533,  
01 155611, 01 155698, 01 155721, 01 155761, 01 228529, 01 242110,  
01 242579, 01 265475, 06 155865, 08 155852, 08 260232, 09 131164

## TREES/PLANTS

03 155805

## TREND

04 163484

## TRIP

01 155611

## TRIP DISTRIBUTION

01 098920, 01 155483

## TRIP GENERATION

01 098920, 01 152720, 01 155482, 01 155588, 01 155682

## TRIP LENGTH

01 155611, 01 202532, 04 155545

## TRIP PURPOSE

01 155830, 01 202532

## TUBES

01 241925, 08 155478

## TULLAMARINE INTERNATIONAL AIRPORT/MELBOURNE

06 155455

## TUNNELS

01 241925

## TURBOFAN ENGINES

03 155779, 03 155943

## TURBOJET ENGINES

03 091352

## TURBULENCE

03 155938

## TURBULENT MIXING

03 155861

## TURNAROUND TIME

08 155852, 08 163502

## TURNING MANEUVERS

02 155724

## TWILIGHT GLOW

08 151570

## TWO POINT BOUNDARY VALUES PROBLEM

08 155460

## TWO SEGMENT LANDING APPROACH

03 155804

## TWO-WAY COMMUNICATION

01 127819

## U

## ULTIMATE STRENGTH DESIGN

06 163536

## UNCERTAINTY

02 155735, 04 155450, 04 155574

## UNDERGROUND STRUCTURES

09 163528

## UNEVENNESS

08 080640

## UPGRADED THIRD GENERATION

08 155471

## URBAN AREAS

01 046998, 01 051326, 01 073899, 01 132054, 01 155464, 01 155656,  
01 155680, 01 155903, 01 155911, 01 260186, 01 265475, 02 155906,  
03 091196, 03 091197, 03 154396, 03 155507, 03 155744, 03 155768,  
03 155774, 03 155781, 03 155795, 03 155819, 03 155863, 03 155934,  
03 224129, 03 261278, 03 291036, 04 155535, 04 155662, 04 158214,  
05 132286, 05 155791, 05 163532, 06 143761, 06 155560, 06 155866,  
06 155868, 06 155884, 06 158217, 09 163510

## URBAN DEVELOPMENT

06 155912, 09 131157

## URBAN PLANNING

03 091198, 03 155783, 04 147239, 05 084118, 06 145845, 06 155865

## URBAN PLANNING/NOISE

03 155723

## URBAN TRANSPORTATION

01 099521, 01 147044, 01 155588, 01 155611, 01 155761, 01 200156,  
01 241383

## URBANIZATION

01 097723, 06 155910, 08 155907

## USER CHARACTERISTICS

01 135405, 01 155492, 01 155495, 01 155564, 01 155761, 01 228030,  
01 241534, 06 155455

## USER CHARGES

02 155670, 02 155730, 06 155815

## USER NEEDS

08 150729

## USER TAX

02 159574

## USERS

02 155615

## USERS MANUAL

02 163509, 03 090348, 03 154741, 08 154310, 08 154726

## UTILITIES

08 155577

## UTILIZATION

08 155946, 08 202302

## V

## VALUE

01 155721, 01 228529, 03 155728

## VANS

01 155738

## VEHICLE CAPACITY

01 155624

## VEHICLE COMPONENTS

01 265478

## VEHICLE COST

01 242101

## VEHICLE DESIGN

01 155624, 01 155629, 09 163489

## VEHICLE MILE

01 155611

## VEHICLE NOISE

05 155770

## VEHICLE OCCUPANCY

01 241963, 01 263929

## VEHICLE PERFORMANCE

01 155624

## VEHICLE SCHEDULING

02 074545

## VEHICLE SPEED

01 155655, 01 241925, 01 265475, 09 163489

## VEHICLES

07 155585, 09 127047

## VEHICULAR SAFETY

01 155624

## VELOCITY

03 155938, 08 155621

## VELOCITY CONTROL

08 075265

## VENTILATION SYSTEMS

08 155750

## VERIFICATION INSPECTION

01 155880

## VERTICAL ALIGNMENT

08 096281

## VERTICAL TAKE-OFF AIRCRAFT

06 155455

## VESSELS

06 155860

## VFR

04 163514, 08 155476, 08 155654

## VIOLATIONS

03 155795, 03 155937

## VISIBILITY

08 080276, 08 094538, 08 155764, 08 163482, 08 163534, 08 163538,  
08 207518

## VISUAL AIDS

06 155866, 08 154355, 08 155596, 08 155666

## VISUAL APPROACH SLOPE INDICATOR

08 155945

## VISUAL FIELDS

08 151570

## VISUAL IMPACT

01 132054

## VISUAL SURVEILLANCE

08 054427

## VOLTAGE

06 163497, 08 163499

## VOLUME

09 163528

## VORTEX AVOIDANCE SYSTEMS

08 163511

## VSTOL

01 241383



# Retrieval Term Index

## VTOL AIRCRAFT

01 051438, 01 155483, 01 201742, 03 075504, 03 155462, 03 155512,  
03 224129, 04 155535, 08 155547

## W

### WAITING TIME

08 155479, 08 155852, 08 155895, 10 155701, 10 155836

### WAKE VORTEX AVOIDANCE

08 155471, 08 155654

### WAKE VORTICES

08 093584, 08 163511

### WALKING DISTANCE

08 155645, 09 155576, 10 073882, 10 155457, 10 155510, 10 155847,  
10 242448

### WARM

08 155946

### WARNING SYSTEM

08 154295

### WASTE WATER TREATMENT

09 163483

### WATER

07 155848, 07 163513

### WATER AERODROME

06 155858, 08 155666

### WATER CIRCULATION

03 155814

### WATER JET CLEANING

08 092377

### WATER LEVELS

06 155894

### WATER QUALITY

03 155783, 03 155814, 03 155886, 06 158236, 08 155713

### WATER TRANSPORTATION

06 158215

### WATERFRONT

01 134030, 06 155860

### WATERWAYS

06 155868

### WAVE REFLECTION

03 155938

### WAVES

08 127693

### WEAPON DETECTION

07 043646

### WEAPONS

07 043646, 07 155489

### WEATHER

04 155650, 06 155806, 06 155860, 08 155532, 08 155713, 08 155764,  
08 163478

### WEATHER REPORTING

08 155867

### WEIGHT

02 155725

### WELLINGTON AIRPORT/NEW ZEALAND

08 163540

### WESTOVER INDUSTRIAL AIRPARK

06 145845

### WET CONDITIONS

08 155606

### WHEEL LOADS

02 155724

### WIDE BODY AIRCRAFT

03 155779, 03 155917, 07 163500, 08 155543, 08 155705

### WIND

03 155935, 08 155474

### WIND DIRECTION

06 155806

### WIND SHEAR

07 163479

### WIND VELOCITY

03 155941

### WINDS

08 155945

### WINNIPEG INTERNATIONAL AIRPORT

10 159712

### WINTER MAINTENANCE

09 163510

### WORKING HOURS

01 155843

### WORKLOAD

08 094537, 08 154336, 08 155478, 08 155532

## X-RAYS

07 155489, 07 155741

## X

## ZONING

03 075504, 03 155502, 03 155605, 03 155775, 03 155785, 03 155808,  
05 155609, 05 155769

## Z